

IRON AGE

editorial

Stalin's Next Move

STALIN and his gang are the same crowd that came into power many years ago. They took over a country lock, stock and barrel after a spontaneous revolution paved the way. They are the same people who killed their so-called friends by the thousands from 1933 on until every last apparent opposition had been liquitated or purged.

Stalin and his cohorts are the same people who lied their way into and out of every conference with the United States and her allies. They are the same people who have gone back on promise after promise. They are the same people who think and act on the basis that they alone have the right of life and death over people under their control.

Stalin and his crowd are the same who started and now direct the Korean War. They are the ones who turn facts into such twisting, writhing, sickening falsehoods that decent people could not possibly understand what they are talking about.

What are their motives? They are simple. Through infiltration and phoney peace moves—if possible—and war if necessary they hope to eventually rule the world. A few years ago they controlled less than 150 million people. Now their agents and gangsters control more than 800 million people.

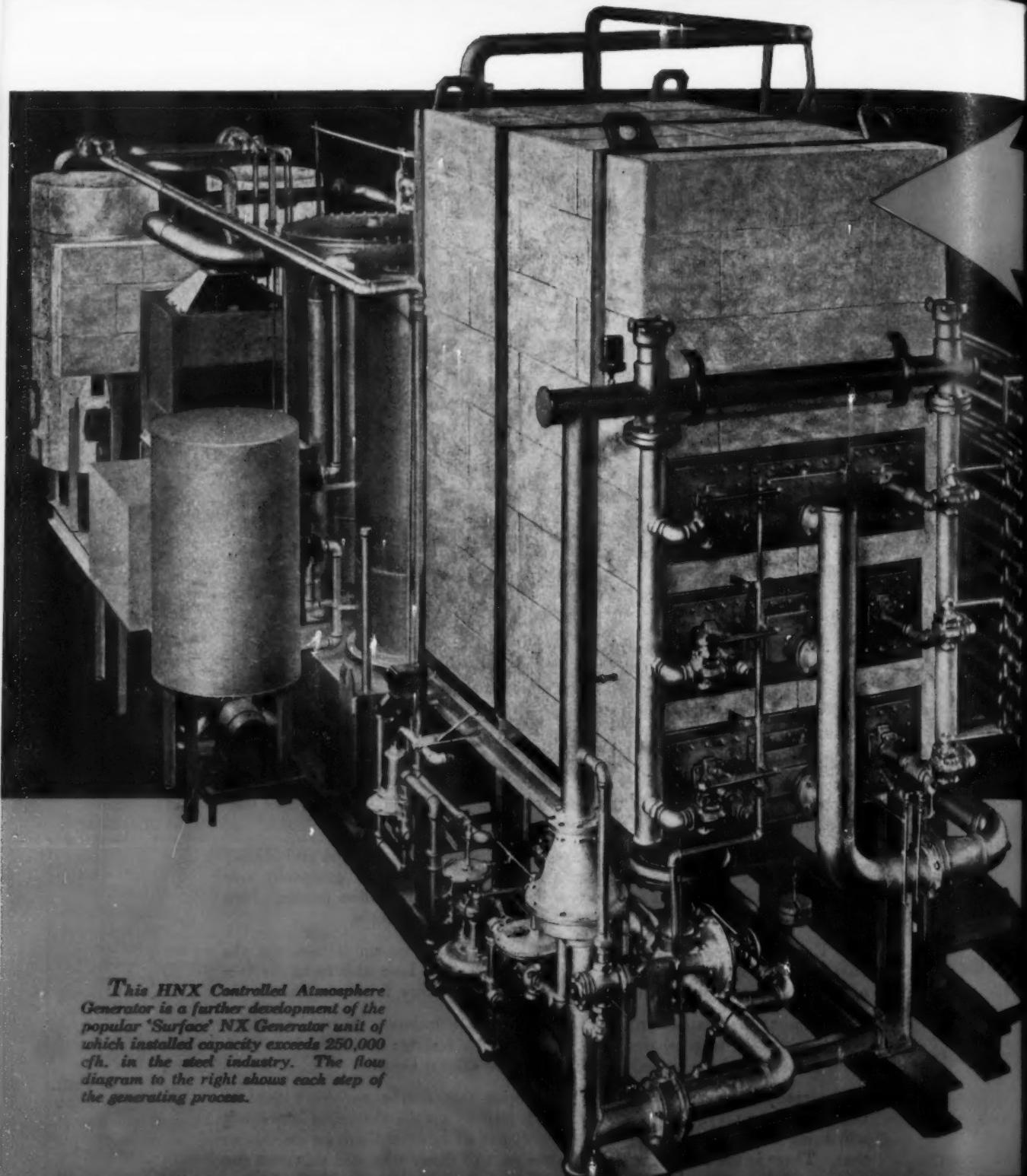
There are people in those countries who would rise up if they got the chance. They have felt that way for years but haven't been able to in the face of a ruthless gang operation that has no equal in history for its brutality.

So what are his next moves? Put out peace feelers. Divide our allies. Foster and make to grow the germ of anti-British feeling; anti-French or anti-allies feeling that has cropped up here due to the "Great Debate."

Already there are rumblings in America that maybe we don't need so much defense; maybe we ought to take it easier; maybe the peace movement will bring results; maybe we ought to pull out of here or there or do this or that. There is the stark ignorance on the part of many who still think we can argue and discuss problems in a normal and decent manner with Stalin and his gang.

That is what he wants us to believe. He wants to ruin us and have us stop half way on a program which we started almost too late. Whether he succeeds or not depends on whether you and you and you remember that it is the same old crowd getting ready the same old stuff and keeping one aim through it all—wreck the free countries one way or another and then take over.

Tom Campbell
Editor



This HNX Controlled Atmosphere Generator is a further development of the popular 'Surface' NX Generator unit of which installed capacity exceeds 250,000 c.f.h. in the steel industry. The flow diagram to the right shows each step of the generating process.

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IRON AGE *newsfront*

*news
methods
and product
forecast*

► At least one hot extrusion steel plant will be in operation by the end of this year. It will extrude bars and shapes in certain stainless grades which will make stainless competitive pricewise with some more common metals.

► Government agencies are now classifying more and more information as "restricted," though complete censorship is not in the cards. While security is the reason always given, some information is being withheld for other reasons.

The fact is that release of information on prime contracts has been the most concrete aid small business has so far been given.

► Molybdenum steels containing 1 pct C and 0.5 pct Mo have proved to be a good substitute for regular 52100 bearing steels. The latter contain 1 to 1.5 pct chromium. Molybdenum is in better supply than chromium and sources are closer to home.

► The rules and the system make it theoretically unnecessary and federal agencies will deny it—but some metals executives will tell you that the best way to get relief from government limitation orders is to go personally to Washington. One company seeking relief from a zinc limitation order got a flat refusal to a pleading letter—then sent a man to restate the case in person. P.S.; They got help.

► Nodular cast iron is expected to find a number of new applications in ordnance. It already has some uses in ammunition.

► Use of porcelain-coated mild steel to replace stainless steel in manifolds and mufflers of combat vehicles is being investigated as a means of conserving critical alloys.

► Some war contractors are just now feeling secondary effects of the Jan. 30-Feb. 9 railroad strike in the form of a sharp drop in incoming parts receipts from vendors whose raw materials were held up by the strike.

► The scramble to obtain skilled help in war production centers like Detroit is on in full swing. There are persistent reports of upgrading.

► A plant to continuously cast steel will be built by Allegheny Ludlum at its Brackenridge, Pa., works. The techniques of the process have been worked out and the remaining problem is merely a continuous supply of hot metal.

► Recent tests on aluminum alloys indicate that under some conditions, prestressing of structural members can greatly increase their fatigue life—especially when prestress and duty stress are both low.

► NPA is expected to issue a production directive to increase steel plate production. It will call for mills to roll more plate on strip mills.

► Because can companies are ordering the new dual coating tinplate in increasing tonnages the producer predicts that demand will continue strong when the tin shortage is over.

Meanwhile, tinplate makers are privately up in arms because of export directives. They say domestic supplies are being cut down while export tonnages go merrily on. Sooner or later more strings will be tied to ECA steel exports. For one thing, they might keep exported American steel from being returned to the U. S. for sale at premiums.



More than America spent to win its Independence

THE Revolutionary War lasted 8 years and its direct cost was \$74,555,642.

This sum is considerably less than the amount Youngstown is spending on expansion--its share of the steel industry's program to help preserve America's 175-year-old freedom from Communistic attack.

Work on a \$90,000,000 construction project at the Indiana Harbor Works, East Chicago, Indiana, is under way. It includes a 1500-ton blast furnace, 75 new coke ovens and 8-250 ton open hearth furnaces, heating furnaces, a high-lift blooming mill, with 6-3 hole recuperative soaking pits, ore dock extension, unloaders and ore bridge, and a vast array of other facilities needed to produce the addi-

tional 1,000,000 ingot tons of steel involved. By the end of 1952, the steel industry expansion program will raise the total steel producing capacity of the United States to over 117-million ingot tons. This is more steel than is made in all the rest of the world combined.

This tremendous investment by the shareholders of private industry is possible only with adequate profit--profit earned in the past and to be earned in the future. This is a symbol of public confidence--confidence that the American system of free enterprise is right and worth saving. Confidence that it will continue to be our way of life through the years ahead.

The Youngstown Sheet and Tube Company
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MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

Scrap
Metal is
Critical
Again

IRON AGE *summary*

*iron and steel
industry trends*

**Scrap shortage gives steelmakers raw material hotfoot . . . Open-end CMP might boomerang . . .
Flat-rolled pinch getting tighter than ever.**

Scrap Shortage Critical—A growing scrap shortage has producers dancing up and down with a raw material hotfoot. The shortage facing hard-pressed steelmakers is not just a spectre; it is very real, and it is threatening to strangle steel production. Electric furnace output has already been reduced and openhearth furnaces will be next—if the tempo of scrap shipments does not increase soon.

Scrap trouble recalls the dark days of 1941, when some openhearth furnaces had to be shut down because of a shortage of scrap metal. Steel people believe this will happen again if steps are not taken to get out the scrap and return it to the furnaces. If it does happen again we would be in the ridiculous position of reducing operations of existing steel capacity, while millions of tons of new capacity are being built.

Record Quantity Needed—Scrap has become a highly strategic commodity. Last year's consumption was an all-time record; this year's requirements are even higher. The National Production Authority has been increasing the tempo of separate allocations of scrap to consumers facing loss of production. It has promised that if steelmaking cutbacks become necessary they will be uniform for all companies in the industry.

Industry and government are preparing to make a strong effort to get out more scrap. Most logical and fruitful sources appear to be old equipment in their own hands and overseas. Present thinking does not contemplate a national scrap drive at the household level, unless it becomes necessary for psychological reasons. Heavy scrap in the hands of industry and government is of much better quality than lighter material in household items. It is also more readily and cheaply processed.

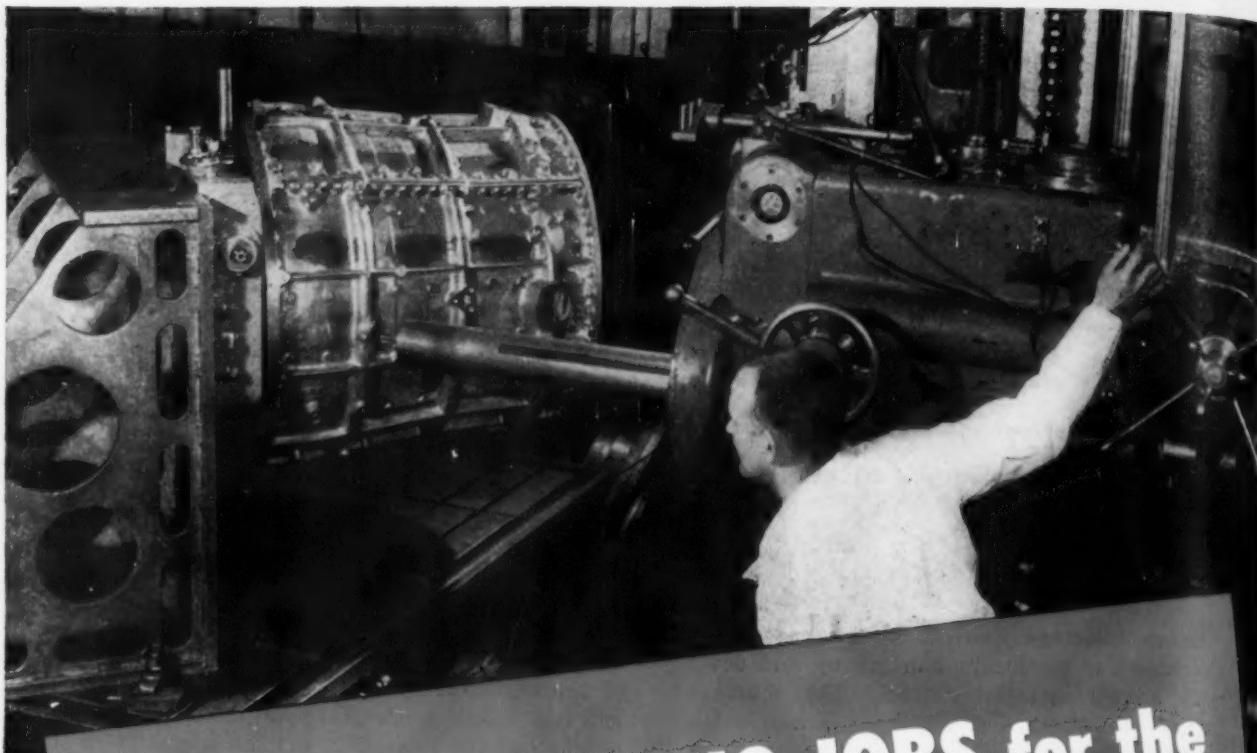
Procurement Scramble Seen—This week NPA officials are debating the future scope and shape of the Controlled Materials Plan, which they will install July 1. Central point of controversy is whether the new CMP will be open-end or complete. Under an open-end plan, which seems favored at this writing, NPA would decide how much material is needed for military and essential uses and the remainder would be left free for non-essential consumers to scramble for. This could create one of the wildest procurement free-for-alls in history. It could also provide plenty of material for future congressional investigations on distribution.

Right on the Nose—The government is now trying to determine the impact of DO and program tonnage on available steel supply. Producers have been instructed by NPA to wire immediately as each month's DO booking by products is completed. This tonnage can be combined with program tonnages to tell how deep a bite essential needs are taking.

IRON AGE estimates last year that defense and essential civilian programs would be taking about a third of total steel output by the middle of 1951 appear to have been amazingly accurate. NPA now estimates that military and supporting programs will require 5 million tons of finished steel during the second quarter. The MRO program just established will require an additional 1 million tons. This totals 6 million tons or 32.4 pct of estimated finished steel output during the second quarter.

Flat-Rolled Pinch—The outlook for flat-rolled steel products is bleaker. NPA estimates that defense and related programs will require 700,000 tons of plate a month. Steel companies are being urged to produce more plate on strip and sheet mills.

(nonferrous summary, p. 154)



PRECISION BORING JOBS for the Famous "ORENDA" Jet Engine

The A. V. Roe Company at Malton, Ontario, find Universal Boring Machines, which are now built by The Bullard Company, ideal for varied machining operations on this exacting work.

The above illustration shows the machining of a Compressor Housing, one of many operations which these machines accurately perform.

Particular advantages of the Bullard-Universal Boring Machines are their versatility and simplified right hand operation.

Close tolerances are absolutely essential in the building of this Jet Engine, and here again Bullard-Universal gives that desired accuracy.

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WIPER
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Benefits to You
No Broken Castings
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to Piston Rods,
Bushings and Seals

**NO COSTLY
"DOWNTIME"**
NO REPAIRS
NO MAINTENANCE
NO POWER WASTAGE

Service from coast to coast

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the standard design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing."

Write for illustrated cylinder bulletins A-105 and H-104

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Dear

EDITOR

letters from readers

Forms and More Forms

Sir:

You published an article by E. J. Hardy, Washington Editor, in your Nov. 9, 1950 issue, in which it was stated that a metalworking form was under discussion which would be designed to give the National Production Authority complete data on materials input, man-hours worked, and output by product. Could you advise us if and where copies of these forms may be obtainable to us.

S. J. NATHAN
New York Mgr.

British Iron & Steel Corp. Ltd.
New York

The form referred to in Gene Hardy's column, "The Federal View," is Form NPAF-1, issued by the NPA. Copies are available at field offices of the Dept. of Commerce. A list of these offices appeared on p. 374 of the Jan. 4 issue of THE IRON AGE.—Ed.

Might Be Loopholes

Sir:

One of our member firms has asked us to ascertain whether or not it is true that the American Government has decreed that metal producers in foreign countries, such as Belgium, no longer need to die stamp the country of origin on their products before shipping them into the United States.

G. H. McCLYMONT
Executive Secretary
American Chamber of Commerce
in Belgium
Brussels

The restricted Merchandise Section of the New York Customs House informs us that there has been no change in the marking regulations. However, these regulations are rather broadly worded, allowing considerable leeway in interpretation. It is our understanding that some steel importers have requested and secured a broader interpretation as to the method of marking.—Ed.

Your Dough and Mine

Sir:

Your very fine editorial of Feb. 15 ["Whose Money Is It?"] has been carefully read and is required reading at this factory. Sometime the subject of your editorial writings could most profitably be directed to all top executives of business calling upon them to go back to first principles and devote at least the time of one golf game or one Rotary meeting or banquet every 60 days to getting closer to their employees and discussing the subject of your editorial, bare handed.

It is we who employ 60 million voters in this country who can correct 90 pct of our ailments if we did our job completely. Making money for the stockholders and ourselves is but a small fraction of our duty in this world and our obligation for being permitted to enjoy the privilege of living, especially in these United States.

Each employer—the head of the company—must speak to his people personally, and point out to them the great necessity of beginning to seek for our political offices, candidates who will stop this squandering of their wealth. There are 40,000 small factories like ours, employing less than 500 employees, who can do much personal contact work like we do here.

F. W. SCHMIDT,
President
Western Metalcraft, Inc.
Olympia, Wash.

Stripper Wanted

Sir:

Can you put us in touch with a manufacturer who could furnish us with an ingot stripper of the portable type such as is hung on an overhead electric traveling crane?

F. B. SEMENOFF
President
F. H. Crawford & Co., Inc.
New York

Yes, IRON AGE described such a stripper (Nov. 23, 1950, p. 71). It is made by the Pittsburgh Engineering & Machine Co. Div. Pittsburgh Steel Foundry Corp., Glassport, Pa.—Ed.

Who Makes It?

Sir:

In your Dec. 14, 1950 issue you have an article entitled "Are You Getting the Most Out of Your Drill Presses." I am interested in the special device attached above the chuck which imparts a reciprocating action to the drill at each revolution to break the drill chip.

Will you please supply the manufacturer's name or mail any catalogs or folders that you may have on this chuck.

E. C. BARNHART
Tool Supervisor
Pontiac Motor Div.
General Motors Corp.
Pontiac, Mich.

Gear Shaver

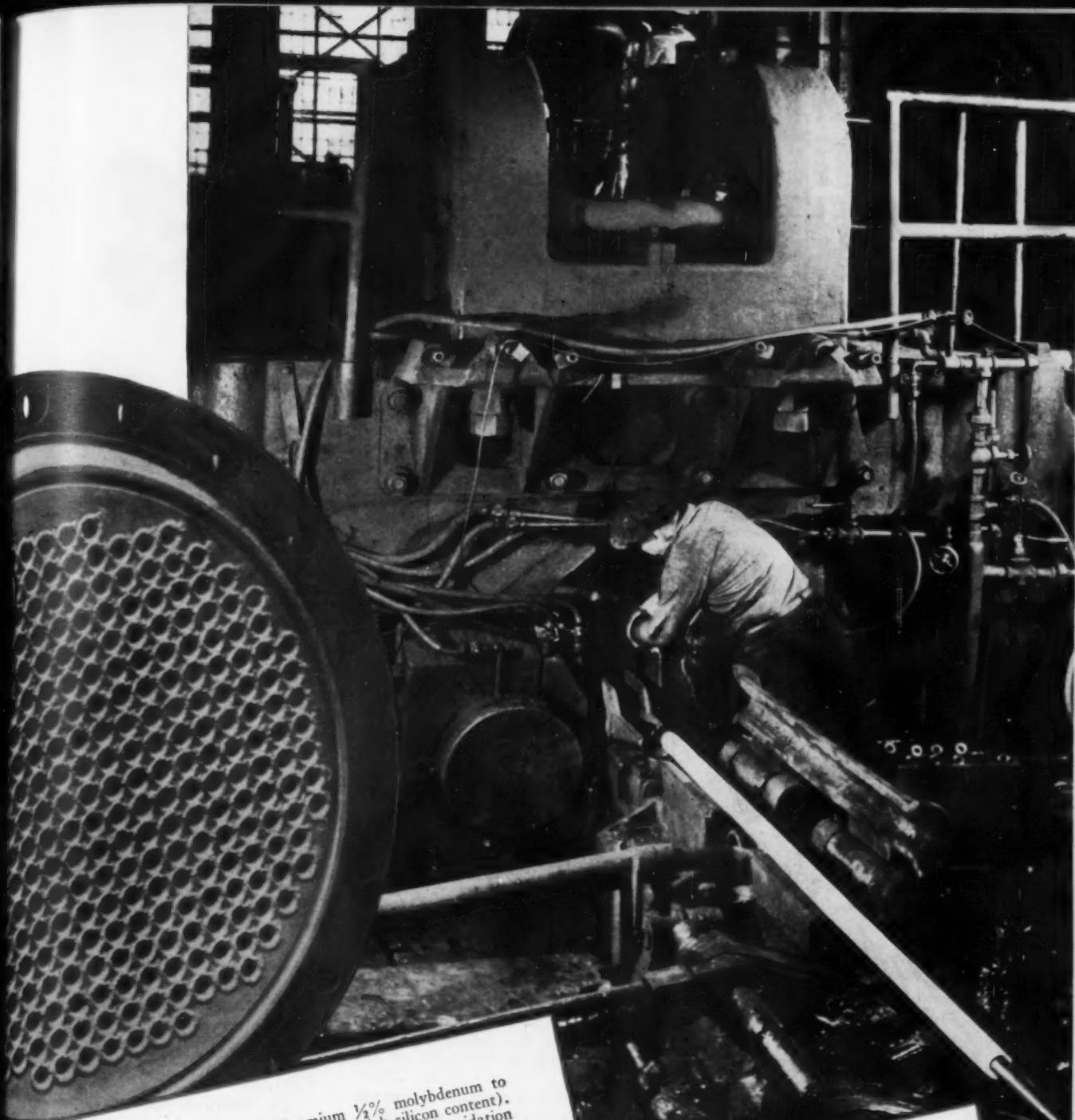
Sir:

In THE IRON AGE Newsfront of Feb. 15 a radially fed gear shaving is mentioned. Could you please give me further information as to the manufacturer of this equipment.

W. R. SPILLER
Chief Engineer
Harris-Seybold Co.
Cleveland

This machine is in use at a General Motors plant. It is a standard Michigan Tool Co. gear shaver modified by General Motors and using a special Michigan cutter. An article on this machine is being prepared.—Ed.

THE IRON AGE



LOW CHROMIUM ALLOYS (1½% chromium ½% molybdenum to 3% chromium 1% molybdenum—some with high silicon content). Principal applications are for service conditions requiring oxidation and corrosion resistance, as well as reasonable strength, at elevated temperatures. These alloys are used to resist rapid deterioration in service involving hot corrosive gases in many industrial applications.

U-S-S STAINLESS STEELS (18-8 and modifications with titanium, columbium or molybdenum). These alloys resist oxidation at temperatures up to 1500°F; they also exhibit excellent strength combined with high ductility and impact resistance, together with maximum corrosion resistance, at all temperatures from the lowest obtainable up to above 1500°F. They find wide application under the most severe service conditions in the heavy chemical industries, including the related fields of petroleum refining and paper making. They are extensively used in food processing, dairy and beverage industries, and drug preparation to avoid taste and color contamination. Their general corrosion resistance makes them useful in the field of plastics preparation, fabric dyeing, and numerous others.



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Fatigue Cracks

by Charles T. Post

They Tell Us That:

It's no wonder basketball players seem so tall with all that money stuffed in their shoes. . . . RFC stands for "Received Fur Coat." . . . Fishermen can tell the weight of a fish by looking at the scales. . . . The "gray market" is merely a reflection of the purchasing agent's hair. . . . The most sought-after extrusion process is one which will squeeze the Iron Curtain.

Aptronym

New president of the North Eastern Poultry Producers Council is Waldo Chick.

Chicken Little

If you've had young ones around the house recently, you will recall the story of Chicken Little in which the animals came to the conclusion that the sky was falling because a rain-drop fell on the head of one of them.

Last week, in the hills across the Hudson, a hunter shot at a crow. The shot went through some trees which screened one of the buildings of a fireworks plant. The building blew up. The concussion detonated several other buildings. Residents of a neighboring village came to the immediate conclusion that the atom bomb had dropped and immediately rushed to the scene to get their share of radiation.

Some readers will tell us that the moral is not to shoot at crows. But we think that a compulsory re-reading of Chicken Little might be a good thing all the way around and wrap it up better.

Customers' Special

We see by your favorite family journal that two special trains took guests to the groundbreaking cere-

monies of U. S. Steel's new Eastern plant at Morrisville. "Most of (the passengers) were customers and some who might build new plants in the area to become eastern customers" the article said.

If all that were necessary to become a customer were to build a plant, we'll bet that the corporation could have filled five special trains.

Puzzlers.

The latest entries in the HOT STUFF contest are I. L. McGinnis, Yeadon, Pa., and L. F. Calzi, Philadelphia. Mr. Calzi and J. J. Kulick, Great Lakes Steel Corp., were right with their answers to the watch problem. A. T. Wolak, Scranton, Pa., is envious of the contractor who received the 1556.336 tons of steel.

In last week's puzzle if you count the number of clicks for 26.6 sec that number will be numerically equal to the speed of the train in miles per hour.

J. S. Coldwell, Milwaukee, has a problem. He has four friends whose occupations are butcher, baker, tailor and carpenter and whose names are Mr. Butcher, Mr. Baker, Mr. Taylor and Mr. Carpenter. Each has a son and daughter but no son practices the same trade as his father. None of the eight males practices a trade of his name. Each son marries one of the daughters, whose maiden name does not suggest his own or his father's trade. Each girl changed her initial when she married. Mr. Butcher, Sr., is not a baker. The trade of Mr. Carpenter, Sr., is the same as young Mrs. Butcher's maiden name. The baker's son married Miss Butcher. Mr. Coldwell would like to know the trade of fathers and sons and the maiden names of the sons' wives.

machine tool high spots

*sales
inquiries
and
production*

by W.A.Lloyd



Pricing Complicated—As delivery dates for many types of machine tools begin reaching into 1952, pricing problems in the field become more grave.

Charles J. Stillwell, president of Warner & Swasey Co., drew the line at quoting on 1952 delivery. He told a group of security analysts in Cleveland that his firm would continue to take orders but will not quote prices on '52 delivery of turret lathes and automatic machines.

Guesswork Doesn't Count—Mr. Stillwell said his company could not guess what costs would be or what prices will be allowed on the basis of those costs and would be putting itself out on a limb in quoting prices for shipments 18 months from now. He pointed out that Warner & Swasey had acted independently of the machine tool industry in suspending quotations.

"How long can we string out with an unknown cost and price basis?" he asked. "We had some relief in the announcement last week which allows us to ship machines on the basis of our established price list from which we were quoting and shipping during the base period."

Unrated Orders Pushed Back—Orders M-40 and M-41 provide, in effect, a 70 per cent priority on govern-

ment business. The remaining 30 per cent, which includes essential civilian and Mutual Defense Assistance Program orders, allows little room for unrated civilian orders which are thus going to be pushed back indefinitely.

What the industry wanted to do was move non-rated civilian orders into the pool, on the theory that any machine tool delivered to a regular customer adds to the defense potential and will undoubtedly be used in the defense effort, rated or otherwise.

No Cash Beforehand—On another score, order M-40 did not carry with it a provision for advance payment, a matter of considerable importance to some companies. Some charge that orders M-40 and M-41 fail to provide two things industry needed most, a blanket priority for materials and some cash.

Companies are now waiting for the percentage breakdown for the distribution of machines among the various branches of the armed forces. Reports from Washington indicate that such breakdowns will be released within 10 days.

Fast Tax Writeoff Withheld—Release of these orders has put the industry in only a very little better position to attack its No. 1 problem in the defense effort—a

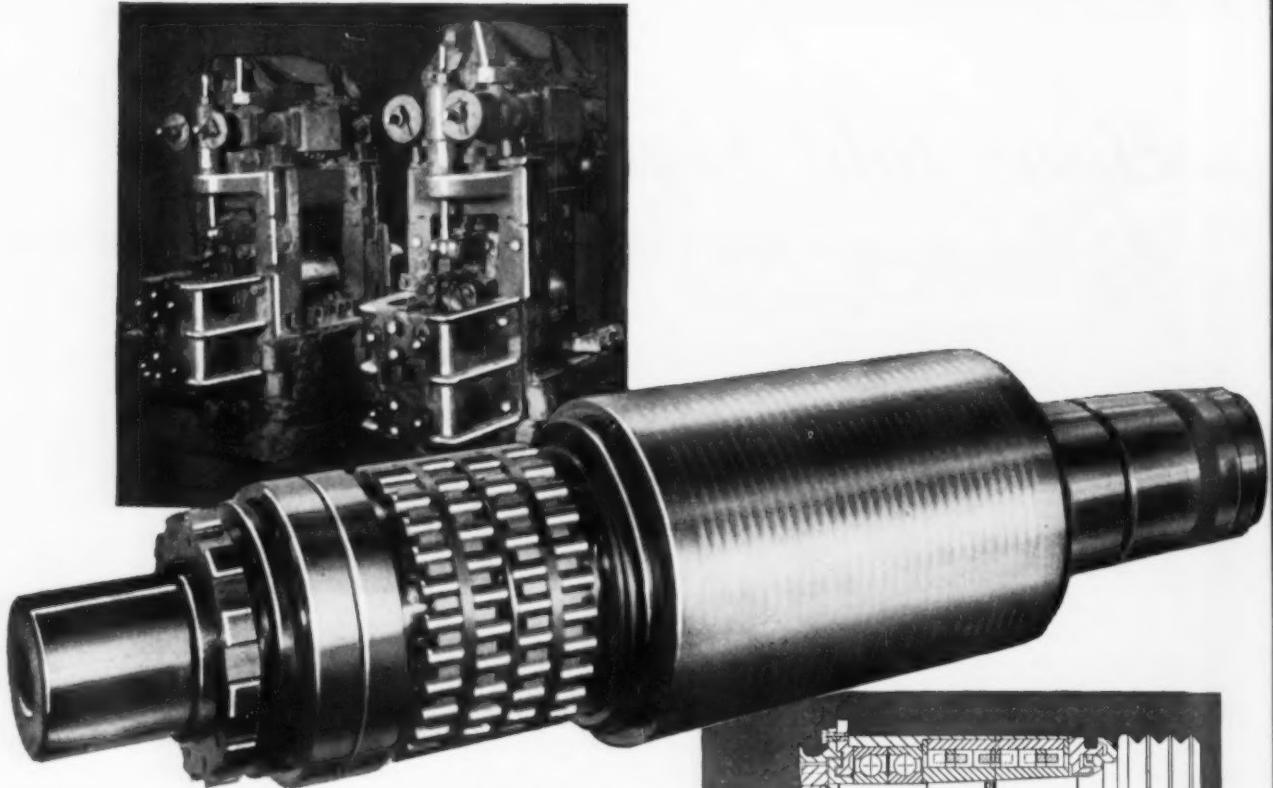
big speedy increase in production. It is believed also that only one certificate of necessity has been granted a machine tool builder thus far, despite the relatively large number of applications that are on file.

Wants to But Can't—Kearney & Trecker Corp., Milwaukee, would like to double its present capacity if it could get a certificate of necessity to speed up amortization of the new equipment required, at a cost of \$1,500,000.

Another major company has had plans drawn for a big plant addition for nearly a year, and no certificate has been forthcoming from Washington.

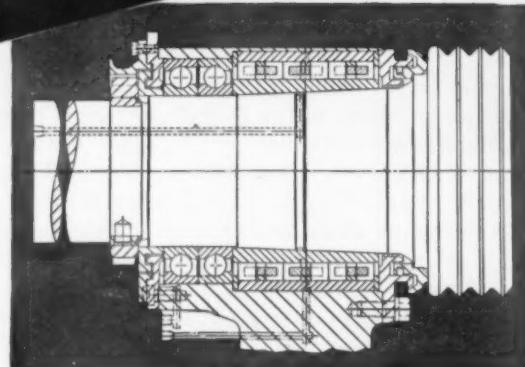
Tracking Down Subcontractors—A big effort is being made by companies to line up subcontractors, many of whom served in a similar capacity in World War II. Companies have engineers in the field surveying subcontracting plant facilities, and the yardstick most commonly employed in appraisal is tooling.

Machine tool builders are picking companies with the same type of machines in their shops as they have. The job is anything but simple, if for no other reason than many potential subcontractors have not yet been told to what extent their civilian production will be curtailed in the next year.



SHIFT AFTER SHIFT

*new roll neck mounting
increases production*



Now mounted on **SKF** bearings, the rod mills of a prominent mid-west mill increases production, shift after shift, and rolls three strands simultaneously. The new roll neck mounting, developed by **SKF**, is made up of a multi-row cylindrical roller bearing that carries the rolling load and angular contact ball bearings for axial stabilization of the rolls—working as a unit. It takes only a minute to mount or

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SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of **SKF** and **HESS-BRIGHT** bearings.

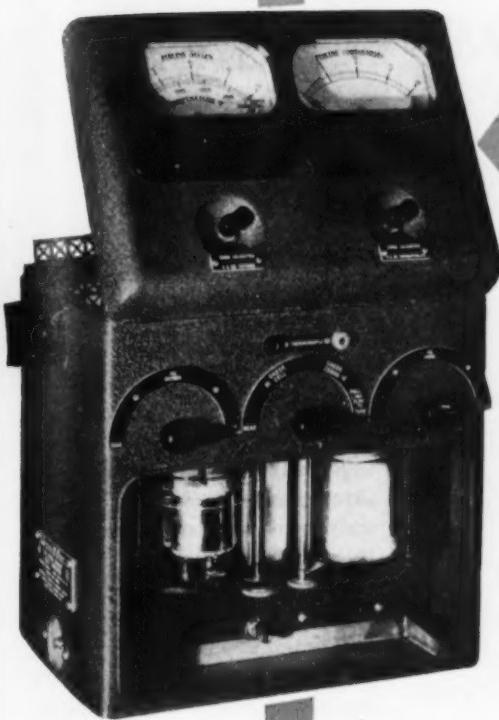
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Surface Finish — Product Uniformity — Engineering Service — Field Service



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--Mill Operations Chief

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FREE publications

These publications describe money-saving equipment and services... they are free with no obligation... just fill in and mail the postcard on the opposite page.

Steel Castings Booklet

Titled "The Steel Casting Industry," a new 24-p. booklet lists seven prime reasons, aside from economy, why virtually all types of manufacturing industries are making increased use of steel castings for a great variety of finished products. Particular emphasis is directed to the steel casting industry's extensive research and product development activities covering a vast range of engineering and mechanical applications. The booklet serves as a handy guide for engineers, management executives and students. *Steel Founders' Society of America.*

For free copy insert No. 1 on postcard.

Gray Iron in Defense

The importance of gray iron castings in a wartime economy is emphasized in a new 4-p. folder intended for distribution among key industrial and government executives. The booklet, "Gray Iron—Facts About The Gray Iron Industry," describes the place of the industry among other metalworking units and its contribution to the war effort in World War II, telling how this second largest industry in the metalworking field has proved vital in peace and essential in war. *Gray Iron Founders Society, Inc.*

For free copy insert No. 2 on postcard.

All About Roofing

A new publication, "Terne Tops," is published primarily for sheet metal contractors in the interests of terne metal roofing. Vol. 1, No. 1 of the 8-p. paper contains an editorial by R. K. Follansbee entitled, "Let's Call It Terne," in

which he asks for an end to the practice of referring to the firm's product as "tin roofing." Terne, he points out, is an alloy consisting of approx 20 pct tin and 80 pct lead. Part of the publication pictures well-known homes and buildings using terne roofing around 1900, telling that some of the roofs shown were old even then. *Follansbee Steel Corp.* Address requests to this column on company letterhead.

Special Tool Steels

An extensive series of special alloy tool steels are described in a new 28-p. booklet describing 13 steels and illustrating examples of tools and dies made from each. The booklet gives complete details on the steels made by this British company, and explains suggested heat treatments for producing optimum properties. Various users' reports are included, and color codes are listed. *Edgar Allen & Co., Ltd.*

For free copy insert No. 3 on postcard.

Solvents Handbook

Written specifically for non-technical personnel, a new 64-p. handbook on organic solvents gives hundreds of definitions, comparison tables, testing methods, and product descriptions on a wide variety of solvents in common use. Data are given on flash-point, toxicity, dry time and solvent power. This pocket-size booklet is of special value to buyers and other personnel who are not technically trained, since it explains in lay language the properties of products and the application of such properties. *Central Solvents & Chemicals Co.*

For free copy insert No. 4 on postcard.

Defense Production Info

A new and comprehensive 8-p. bulletin on heating and heat treating equipment for defense production covers heating for forging as well as heat treatments to develop the required properties for all kinds of ordnance material. Among the items covered in the bulletin are ammunition, guns, tanks, aircraft and ships. The production of engines, power transmission equipment, as well as tools and special parts, is also covered. *Surface Combustion Corp.*

For free copy insert No. 5 on postcard.

Safe Coal Storage

An 8-p. educational booklet entitled "Economic Coal Storage" is suited as a training aid on safe, orderly coal handling methods. The booklet describes use of the most flexible type of equipment, with low operating cost, obtained by a small investment, which teaches how to store coal without the hazards of fire and oxidation. *Tractor Div., Allis-Chalmers Mfg. Co.*

For free copy insert No. 6 on postcard.

New Brushing Catalog

A new 76-p. brushing catalog, designed to simplify selection of the best brush for the individual job, contains numerous illustrations of industrial brushing operations, along with photos and descriptions of a complete line of power, paint, varnish and maintenance brushes. The booklet includes a 3-p. digest of the origin of Osborn brush materials from many parts of the world, a section on se-

Turn to Page 140

NEW production ideas

new and improved production ideas, equipment, services and methods described here offer production economies . . . fill in and mail postcard.

Oil Fog Lubricator

Gives uniform distribution of oil fog, with precision flow control.

A new Micro-Fog Lubricator creates a true fog that remains in suspension longer, may be carried distances many times greater than heretofore, it is reported, and provides more uniform distribution of oil fog to many outlets. Less air flow is required and possibility of oil flooding the lines and tools is minimized. Precision flow control is provided down to as little as one drop of oil in 20 min, if desired. Reclassification of the fine oil particles at the point of application makes the fog wettable to almost any desired degree. The lubricator is completely automatic. C. A. Norgren Co.

For more data insert No. 18 on postcard.

Countersink

For pneumatic countersinking in all types of sheet metal.

Utilizing a standard bayonet type countersink, the tool has a built-in lubricator and can be operated by anyone without special training. It countersinks in all types of sheet metal, including 27 St and 75 St aluminum and alloy steels. Mandrels for varying hole diameters and countersinks can be changed rapidly, without dismantling the tools. A built-in micrometer gives accurate adjustment. Manufactured in six sizes, the Cleco Airmatic countersink capacity ranges from 5/16 to 5/8 in. hole diameters, with metal thickness to 1 1/4 in. Smaller sizes weigh 18 lb; larger sizes 19 lb. Cleco Div., Reed Roller Bit Co.

For more data insert No. 19 on postcard.

Exhaust Fan

For handling sulfuric acid fumes; reportedly gives longer fan life.

The fan is used in chemical plants and steel mill or metal working shops where sulfuric acid is used for processes such as pickling. It is constructed of Carpenter Stainless No. 20 and is capable of withstanding sulfuric acid attack at temperatures up to 176°F. International Engineering, Inc.

For more data insert No. 20 on postcard.

Induction Brazing Machine

Provides quick setup for brazing, heat treating moderate size parts.

The machine has a heavy steel table with an adjustable press type fixture. It bolts directly to the front of Sieco standard induction heaters. The machine uses a modified drill press head in which the mechanism is reversed so that its spring load holds the workpiece down against an anvil. The chuck is used to secure and center a vari-

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FREE publications

These publications describe money-saving equipment and services... they are free with no obligation... just fill in and mail the postcard on the opposite page.

Steel Castings Booklet

Titled "The Steel Casting Industry," a new 24-p. booklet lists seven prime reasons, aside from economy, why virtually all types of manufacturing industries are making increased use of steel castings for a great variety of finished products. Particular emphasis is directed to the steel casting industry's extensive research and product development activities covering a vast range of engineering and mechanical applications. The booklet serves as a handy guide for engineers, management executives and students. *Steel Founders' Society of America.*

For free copy insert No. 1 on postcard.

Gray Iron in Defense

The importance of gray iron castings in a wartime economy is emphasized in a new 4-p. folder intended for distribution among key industrial and government executives. The booklet, "Gray Iron—Facts About The Gray Iron Industry," describes the place of the industry among other metalworking units and its contribution to the war effort in World War II, telling how this second largest industry in the metalworking field has proved vital in peace and essential in war. *Gray Iron Founders Society, Inc.*

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THE IRON AGE

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NEW YORK 17, N. Y.

production ideas

Continued

ety of simple workholding fixtures. It is not necessary to rotate the workpiece. Operating controls are at the top of the machine. A load meter reads directly the percentage of full load. Output frequency is in the megacycle range, and both steel and brass work can be handled. Machines operate on 220 v, 60 cycle, single phase supply lines. *Sherman Industrial Electronics Co.*

For more data insert No. 21 on postcard.

Hard Facing Rod

Oxyacetylene welding rod for medium impact and high abrasion.

Known as Wear-Flame 40, a new welding rod is a centrifugally cast hard facing rod consisting of highly wear-resistant chromium carbides contained in a hard iron chromium, manganese alloy matrix. Overlays offer a high resistance to wear on parts subjected to medium impact and compression. Hardness

is retained at relatively high temperatures. Hardness of deposited metal is Rc56-58. Sizes are $\frac{1}{8}$ in. diam x random lengths; 5/32 to $\frac{3}{8}$ in. diam x 14 in. long. *Alloy Rods Co.*

For more data insert No. 22 on postcard.

Oil Burner Safeguard

Combustion safeguard system cuts off fuel in case of failure.

A new electronic combustion safeguard system for commercial oil burners is said to assure positive protection against combustion failure; if the gas pilot does not ignite, the supply of fuel is cut off. After the cutoff, the motor continues to operate for 30 sec to purge the nozzle or cup of unburned fuel to prevent carbonizing and reduce field servicing. The system is then locked against further operation until manually reset. The co-ordinated equipment includes a switch-amplifier-contactor unit, phototube holder, and electrode holder. *General Electric Co.*

For more data insert No. 23 on postcard.

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Title	<input type="checkbox"/>	Title	<input type="checkbox"/>
Company	Fill in above the number of the item on which you need further data.	Company	Fill in above the number of the item on which you need further data.
Co. Address	THE IRON AGE, New York 17	Co. Address	THE IRON AGE, New York 17
Name	3/15/51	Name	3/15/51
Title	<input type="checkbox"/>	Title	<input type="checkbox"/>
Company	Fill in above the number of the item on which you need further data.	Company	Fill in above the number of the item on which you need further data.
Co. Address	THE IRON AGE, New York 17	Co. Address	THE IRON AGE, New York 17

Dual-Purpose Hand Truck

Features built-in hydraulic hoist for lifting and stacking.

A combination hand truck and stacker can be used for loading and unloading heavy cases and barrels from ground level where loading docks are not available. It enables one man to load and stack heavy merchandise, after transporting from one location to another. This Lift Stacker weighs 111 lb; has 500 lb capacity, and will lift loads to tail-gate height of 54 in. The platform is 22 x 19 in. *Clark-Hopkins Equipment Corp.*

For more data insert No. 24 on postcard.

Flow Control Valve

Maintains constant flow over a wide differential pressure range.

Having innumerable applications in hydraulic circuits and systems, a versatile, 1500 psi, compensated type flow control valve maintains constant flow regardless of variation in inlet and outlet pressure. It is adjustable from completely shut off position to 25 gpm maximum flow, with control lever rotation (270°) permitting accurate flow settings. Eight model variations are available for $\frac{3}{8}$ and $\frac{1}{4}$ in. pipe sizes. *Adel Div., General Metals Corp.*

For more data insert No. 25 on postcard.

Lens Tissue

Silicone-treated tissue for cleaning goggles and glasses.

Development of a superior silicone-treated tissue for cleaning goggles and glasses in factories, mills and offices has been announced. Sheets are interfolded for handling in a simple dispenser. They are trade-marked Magic Lens Tissue. *Silicone Paper Co. of America, Inc.*

For more data insert No. 26 on postcard.

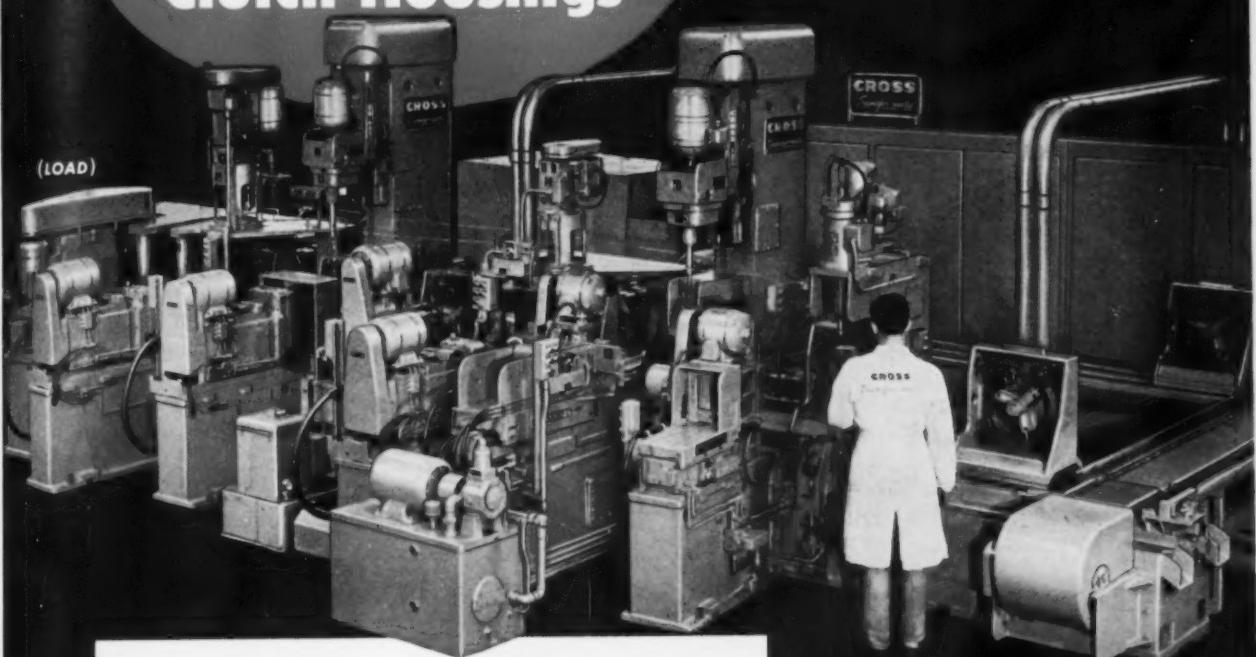
Magnetic Conveyer Element

Available in 3 styles for conveying skelp, plate, sheet, rod, bar, pipe.

Many advantages are said to accrue to the user of an Alnico magnetic conveyer element: Because a standard iron pipe length or other standard section can be used as the revolving induced magnetic unit, the conveyer elements are simple to repair, resurface or replace. A maximum amount of conveyed magnetic material is subjected to the direct action of the magnetic field,

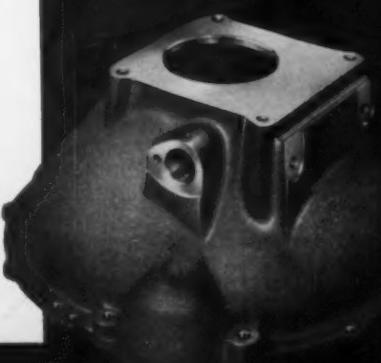
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**Mills, Drills,
Bores, Reams,
Chamfers, and Taps
Clutch Housings**



- ★ 94 pieces per hour at 100% efficiency
- ★ Palletized work fixtures for holding part during all operations
- ★ 9 stations, including 1 for loading, 7 for cutting and 1 for unloading
- ★ Automatic transfer from station to station
- ★ Integral conveyor automatically returns palletized fixtures from unloading to loading station
- ★ Built-in chip conveyor

(UNLOAD)



Established 1898

THE **CROSS** CO.
DETROIT 7, MICHIGAN
Special MACHINE TOOLS

production ideas

Continued

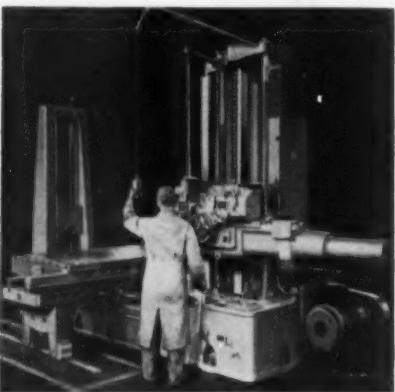
inasmuch as the major magnetic field is at right angles to the material movement and extends for the full width of the conveyor. The magnetic force is not limited by the diameter of the magnetic rotating member since the magnetic element is a separate unit and can be varied in size and strength as required. The magnetic strength of the unit can be adjusted by changing the air gap between the plate magnet and revolving members suspended above. Eriez Co.

For more data insert No. 27 on postcard, p. 35.

Single-Spindle Machine

Has maximum machining efficiency when using carbide cutting tools.

Speeds from 10 to 1300 rpm in fine increment through 45 changes provide the new single-spindle, high speed horizontal boring, drilling and milling machine with specific metal working advantages. Closer speed selection permits high machining efficiency when using carbide and cast alloy tipped cutting tools. Where carbides are not required the machine has capacity and adaptability for light, medium and heavy duty machining. The



machine is designed to meet production requirements that demand continually faster cutting speeds, heavier cuts, better finishes and greater accuracy—with overall economy in operation. New structural features have been added to the basic G&L machine. Heavy duty, hardened bed and saddle ways maintain high machining accuracy over longer periods of time; a 4-in. diam nitrallloy steel spindle having 30-in. travel and rotating on anti-

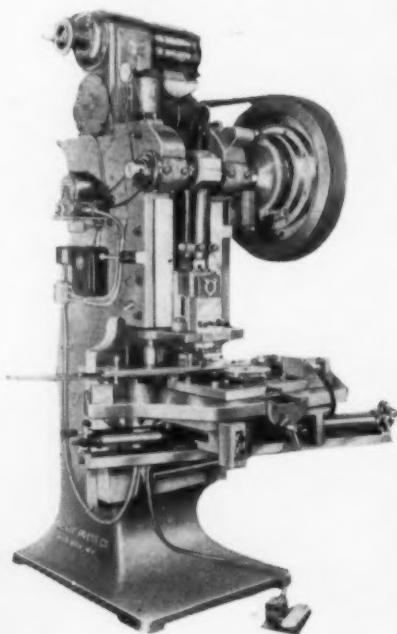
friction bearings, provides speeds to 1300 rpm; positive, automatic machine settings to close limits are possible with a quick-acting electrically-operated positioning device; and electric pushbutton control station has forward-reverse-stop-and-inch buttons. Giddings & Lewis Machine Tool Co.

For more data insert No. 28 on postcard, p. 35.

Segmental Notching Press

Notches motor segment laminations; needs no index ring, spacing is in die.

A segmental notching press is used for the notching of rotor or stator segments of the larger sizes



that cannot be handled on the conventional index ring type fixture. Capacity is from 24 in. diam segments up to a straight line. The segment blank is placed in position on the fixture and by a foot switch is automatically moved into notching position against a stop, which immediately starts the press and performs the prescribed notching operation. At the end of the cycle, a micro switch action stops the press and returns the notched segment to its original position for removal. V & O Press Co.

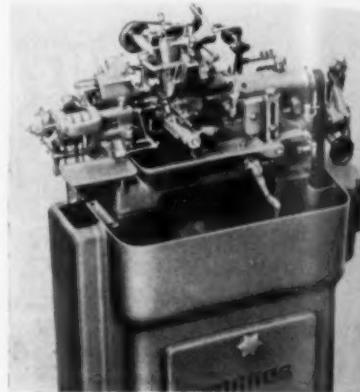
For more data insert No. 29 on postcard, p. 35.

Automatic Screw Machine

Produces very small precision screws used in instruments.

Identified as the Tornos Automatic Type TV, the new machine works on the same principle as

other Tornos models with the sliding headstock. A combination of four radial tools for the turning, forming or cutting-off operations, a sensitive threading spindle and a



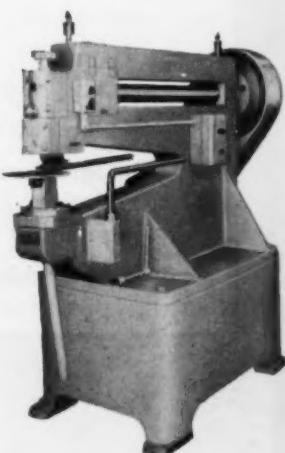
slotting attachment of new design enables the production of high precision screws with maximum output. By means of multiple cams, screws of different sizes can be produced without changing the tooling and without loss of production time. A headstock spindle stopping device, consisting of a friction clutch, is controlled by adjustable cams, and can be set at any time during the cycle of the camshaft. Carl Hirschmann Co.

For more data insert No. 30 on postcard, p. 35.

Nibbling Machines

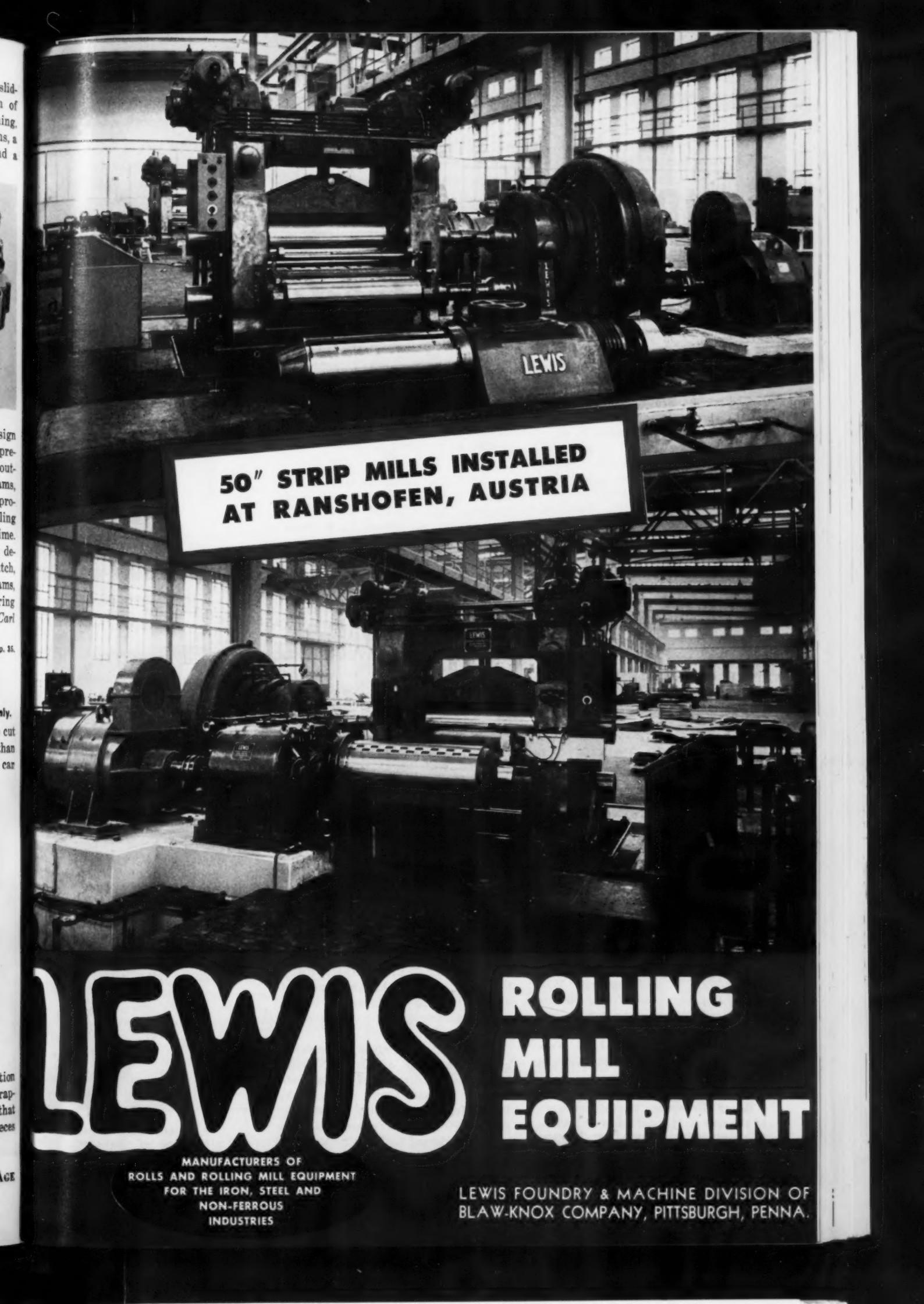
Cut odd shapes of ferrous and nonferrous metals quickly, cleanly.

Campbell nibblers are said to cut from 40 to 60 times faster than drilling and filing. The work car



be fed equally well in any direction because the work is cut with a rapidly moving circular punch that operates over a circular die. Pieces

Turn to Page 146



**50" STRIP MILLS INSTALLED
AT RANSHOFEN, AUSTRIA**

LEWIS

MANUFACTURERS OF
ROLLS AND ROLLING MILL EQUIPMENT
FOR THE IRON, STEEL AND
NON-FERROUS
INDUSTRIES

**ROLLING
MILL
EQUIPMENT**

LEWIS FOUNDRY & MACHINE DIVISION OF
BLAW-KNOX COMPANY, PITTSBURGH, PENNA.

IRON AGE

introduces

Graham B. Brown, appointed administrative assistant by TUBE REDUCING CORP., Wallington, N. J.

Frank U. Naughton, Jr., named manager of the Eastern sales division, Hyatt Bearings Div. of GENERAL MOTORS CORP., Harrison, N. J.

Howard K. Suter, named plant manager of ROSAN, INC., South Gate, Calif. Mr. Suter will be in full charge of manufacturing facilities and will be responsible for developing new methods and expediting the business of the company.

C. B. Foster, heads a new department of the sales division as manager-contract sales and John W. Post was named regional manager of the Washington, D. C., region for CUMMINS ENGINE CO., INC.

Joseph W. Fiske, elected director and assistant treasurer of the J. W. FISKE IRON WORKS, New York.

Robert D. Scott, Jr., appointed general manager-production for all plants of the B. F. GOODRICH CHEMICAL CO., Cleveland. John L. Nelson succeeds Mr. Scott as plant manager at Louisville.

R. A. Metcalf, appointed assistant sales manager of the MILLER ELECTRIC MFG. CO., Appleton, Wis. Other appointments: W. H. Siefferman, Northwestern district manager; F. H. Beck is now taking over the state of Michigan; and J. E. Vosburgh has been appointed Western district manager.

Harry Brownlee, named manager of the new Gulf coast office of PAULSEN-WEBBER CORDAGE CORP., New Orleans.

W. E. Bannerman, appointed vice-president of PAGE-HERSEY TUBES, LTD., Toronto, and C. S. Webber appointed as assistant to the president.

A. F. Garcia, named manager of the Tacoma aluminum reduction works of KAISER ALUMINUM & CHEMICAL CORP., to succeed C. P. Love who will head the corporation's new aluminum reduction plant at New Orleans.

Norman W. Calkins, named manager of tool steel sales and Harold A. Grossman, manager of alloy steel sales by the CARPENTER STEEL CO., Reading, Pa.

Frederick L. Rowe, appointed district sales manager by the AMERICAN CHAIN & CABLE CO., INC., for the American Chain and Manley divisions, with headquarters at San Francisco.

Charles M. Hollis, elected a vice-president of KAISER-FRAZER CORP., Willow Run, Mich. Mr. Hollis is comptroller of the corporation, with R. J. Jaspersen appointed his assistant.

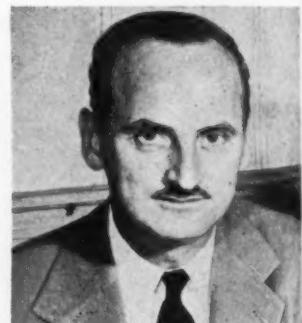
W. H. Dickinson, appointed director, engineering department, headquarters manufacturing division of WESTINGHOUSE ELECTRIC CORP., Pittsburgh. G. P. Longabaugh, appointed director of the headquarters equipment department.

Arthur P. Cortelyou, appointed general manager of U. S. VANADIUM CO., a division of Union Carbide & Carbon Corp., New York. R. M. Mahoney, formerly of the company's Pine Creek operations, has been transferred to New York.

Turn to Page 52



A. MACFADYEN, elected president and general manager of Page-Hersey Tubes, Ltd., Toronto.



JAMES F. BISHOP, elected to the board of directors of the American Hoist & Derrick Co., St. Paul.



P. G. MATTERN, elected assistant secretary of Bethlehem Pacific Steel Corp., San Francisco.

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Straight story about TIMKEN® bearings

THE new Taylor Wilson rotary straightener shown below can handle heavy wall alloy tubing up to 9 $\frac{1}{2}$ " diameter. Tubing is straightened by a total of eight rolls—four driven rolls, one entry roll, two idling rolls and one delivery roll. All are mounted on Timken® tapered roller bearings for friction-free trouble-free operation.

Timken bearings are also used in the main drive and the auxiliary drive. Due to the line contact between the rollers and races, Timken tapered roller bearings have extra

load-carrying capacity. Their tapered construction permits them to take radial as well as thrust loads in any combination. Deflection and end-movement are minimized, wear on moving parts reduced.

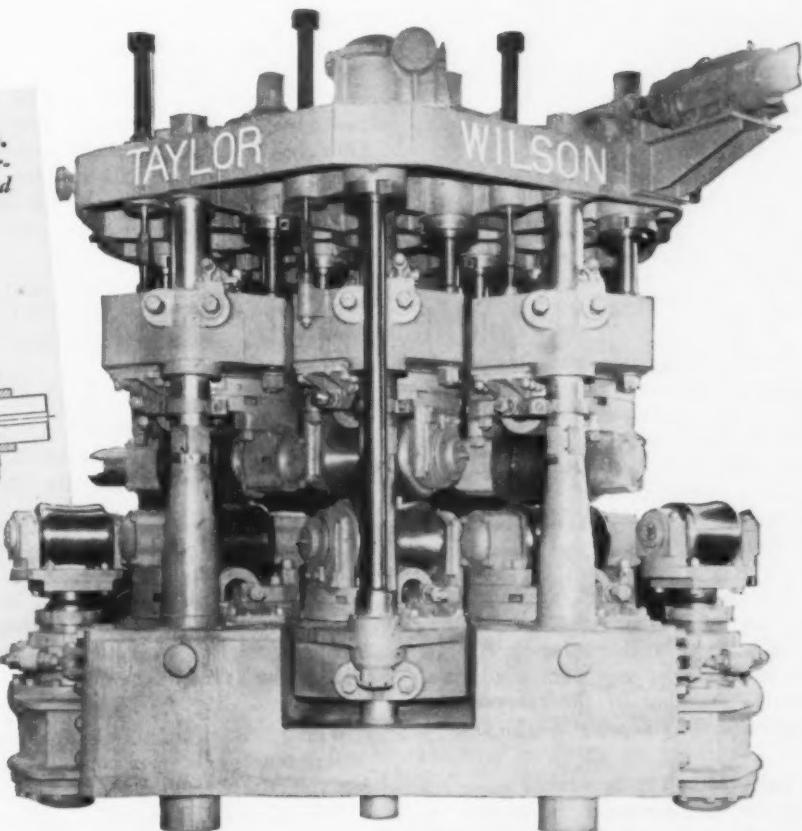
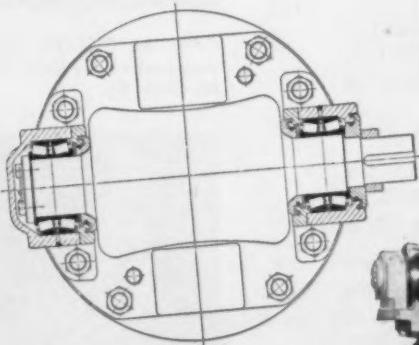
Timken bearings are manufactured to extreme limits of precision and finished to incredible smoothness, resulting in practically friction-free operation. Under normal usage they last the life of the machine because they are (1) engineered for the job, (2) made of Timken fine alloy steel and (3) precision manufactured.

The dependable performance of Timken bearings has made products equipped with Timken bearings first choice throughout industry. When you specify bearings, specify Timken bearings. And when you buy new equipment, make sure it has the advantages that only Timken bearings can give it. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.

How TAYLOR WILSON MANUFACTURING CO. mounts straightener rolls on Timken bearings for dependable, low-cost service and long life.



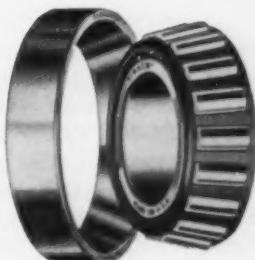
IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

Obviously a big advantage *above the line* gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

IRON AGE

introduces

L. S. Chadwick, retired as president and chairman of the board of PERFECTION STOVE CO., Cleveland. Mr. Chadwick joined the organization as a consulting engineer in 1912, when it was known as the Cleveland Foundry Co., and became president in 1922.

Dale D. Spoor, granted a leave of absence as manager of the equipment sales department of AIR REDUCTION SALES CO., New York, to serve with the National Production Authority in Washington, D. C.

Ray F. Ellis, appointed assistant director of sales; **Augustus Vogel**, general sales manager, Industrial Div.; **H. Waddle**, general sales manager of the Mill Div.; **A. L. Martinson**, general sales manager of the Hardware Div., of the E. C. ATKINS & CO., Indianapolis.

Gustav Schwab, Jr., appointed assistant purchasing agent of DRAVO CORP., Pittsburgh, replacing **William R. Havlak** who was named administrative manager of the contract department, Engineering Works Div.

John Mikulak, appointed assistant to the vice-president in charge of manufacturing of WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J.

Roy Paulsen, named general manager of A. C. Woods & Co., Rockford, Ill., wholly-owned subsidiary of KROPP FORGE CO.

James Edward Gallagher, appointed Eastern division sales manager of CORY CORP., Chicago. Mr. Gallagher will supervise the 14 state Eastern division territory of the company, which is divided into five sales territories.

Rudolph Smith, named works manager of the Pueblo plant of the COLORADO FUEL & IRON CORP., filling the position which has been vacant since 1949. **George Grosvenor**, Mr. Smith's former assistant, has been promoted to superintendent of the openhearth department. **Iver T. Ellingboe** becomes assistant superintendent of the openhearth and **Harold Gumma** was promoted to assistant superintendent of the rolling mills.

T. M. Evans, elected to the board of directors of the WHITE MOTOR CO., Cleveland. Mr. Evans is president of H. K. Porter Co., Inc.

James M. Rowe, elected to the board of directors of LAMSON & SESSIONS CO., Cleveland. He fills a board vacancy.

R. L. McCann, elected president of the NEW JERSEY ZINC CO., New York. Mr. McCann succeeds **Henry Hardenbergh**, who was elected chairman of the board of directors.

Wilbur B. McLaren, appointed superintendent of personnel at the Indiana Harbor Works of INLAND STEEL CO., Chicago.

O. J. Stoudt, promoted to sales manager, southern division of BRUMLEY-DONALDSON CO., Los Angeles.

Glen T. Johnson, named general manager of the San Leandro, Calif. plant of the DODGE BROS. CORP.

William B. Keirn, appointed superintendent of a cold rolling mill and tin plate mill now being built at the Fontana Works of the KAISER STEEL CORP., Fontana, Calif.

Turn to Page 88



CARL M. RIEFFKIN, elected vice-president of Newport Steel Corp., Newport, Ky.



CYRIL GRINDROD, elected a vice-president of the Dole Valve Co., Chicago.



JACOB LEVINSON, named director of purchases for The Levinson Steel Co., Pittsburgh.

IRON AGE

salutes

Albert J. Berdis



THE man who will operate U. S. Steel's huge new Fairless Works was one of those kids who had two strikes against him but who managed to belt the pay-off pitch out of the park. It wasn't a fat pitch either.

Much of his early life was a struggle with finances; he had to quit Purdue for 2 years to earn enough money to go back. He earned it working in the Gary Sheet and Tin Mill.

Looking back, his big break came when he was one of five promising freshmen taken in tow by a U. S. Steel Corp. "talent scout" looking for potential executive timber. That didn't solve his problems by any means, but it did improve his aim.

After college he went to work in Pittsburgh as chief design engineer for U. S. Steel's Irvin Works. Later he served as chief engineer and in 1945 became assistant to the general superintendent. When the corporation decided to build the Eastern mill he worked on the layout and design of the plant he will operate.

Al Berdis is one of those rare persons who takes the time to do the things that many people claim they are too busy to do. It's just his nature—he's surprised to find how well it pays.

His hobby is one of the greatest and most interesting in the world—people. He likes people, likes to be with them and help them when he can. One reason is his deep sense of gratitude for what others have done to help him. Also, he finds that in helping others he invariably helps himself.

Al has come to the top fast. He's still a young man (41) by any standard, and especially so for the big job facing him. But people who know him aren't fooled by the boyish look. They have confidence he'll keep right on being a winning player.

IRON AGE *introduces*

Continued



JOHN E. CARROLL, elected to the office of vice-president of sales of the American Hoist & Derrick Co., St. Paul.



R. S. GRUVER, appointed temporarily, special assistant to the president of Armco Steel Corp., Middletown, Ohio.



FREDERICK J. GRIFFITHS, elected a member of the board of directors of Follansbee Steel Corp., Pittsburgh.



LAWRENCE V. NAGLE, elected a director of the UDYLITE CORP., Detroit. Mr. Nagle is vice-president and national sales manager of the company.

Donald F. Kittredge, appointed manager of sales, railway division, New York, by NATIONAL MALLEABLE & STEEL CASTINGS CO.

Gilbert F. Stenger, named fleet sales manager of the truck tire sales department of the B. F. GOODRICH CO., Akron, Ohio. Mr. Stenger succeeds Howard F. Kidwell, transferred to Detroit, in the company's automotive, aviation and government division.

Herbert E. Smith, elected a director and a member of the finance committee of the U. S. STEEL CORP., New York.

William A. Burns, Jr., and J. B. Wharton, Jr., elected members of the board of directors of the TRAILMOBILE CO., Cincinnati.

Paul A. Wick, appointed assistant to the president of the ROCKWELL MFG. CO., Pittsburgh.

Gerald E. Smart, named assistant plant engineer at the Norwood, Ohio Works, of ALLIS-CHALMERS MFG. CO. Dwight H. Lory, appointed to the electrical sales and engineering department at the Norwood Works.

R. L. Prain, elected a director of the INTERNATIONAL NICKEL CO. OF CANADA, LTD. Mr. Prain is chairman and managing director of Rhodesian Selection Trust, Ltd., Mulfulira Copper Mines, Ltd., and Roan Antelope Copper Mines, Ltd.

Wyman L. Wills, named in charge of extruded solder sales at the Whiting, Ind. plant of FEDERATED METALS DIV., American Smelting & Refining Co.

E. C. Delano, appointed manager of the New England district of the WESTINGHOUSE ELECTRIC CORP., Boston. Mr. Delano started with the company 30 years ago.

Robert R. Person, appointed staff assistant to the manager of manufacturing, Large Apparatus Div., of GENERAL ELECTRIC CO., Schenectady.

Walter H. Roesing, appointed district sales manager of certain areas of New York, New Jersey and Connecticut, for DEWALT INC., Lancaster, Pa.

Lloyd R. Loewen, elected treasurer and assistant secretary of the MIDVALE CO., Philadelphia.

Leslie M. Cassidy, elected chairman of the board and chief executive officer of JOHNS-MANVILLE CORP., New York and Adrian R. Fisher was appointed president.

Horace H. Hopkins, appointed an assistant to the treasurer of E. I. DU PONT DE NEMOURS & CO., Wilmington, Del. Named to succeed Mr. Hopkins as assistant general manager of the fabrics and finishes department is David H. Dawson, now assistant general manager of the pigments department. Joseph Shrader, Jr., succeeds Mr. Dawson.

C. H. Morse, Jr., appointed manager, locomotive service department, Railroad Div. of FAIRBANKS MORSE & CO., Chicago.

G. O. Griffin, named insurance manager for DRAVO CORP., Pittsburgh. Robert Hughes has been appointed executive assistant to the general manager of the Engineering Works Division.

OBITUARIES

Harry W. Schuetz, 66, vice-president of Pittsburgh Screw & Bolt Corp., died recently. Mr. Schuetz was associated with the company since 1928.

C. D. Barr, Jr., 38, associated with the American Cast Iron Pipe Co., died recently after a long illness.

Phillip J. David, 75, a toolmaker at the Singer Mfg. Co., Elizabeth, N.J., for over forty years, died March 6, 1951.

Lewis H. Brown, chief executive officer of the Johns-Manville Corp., New York, died recently.

Stuart A. Dussalt, president and general manager of the Dussalt Foundry Corp., Lockport, N.Y., died March 6, 1951.

John B. Thomas, 77, for the past 25 years a roller for the Weirton Steel Corp., Weirton, Pa., died recently.

Ernest Murphy, 67, former president of the Pressed Steel Car Co., died recently at Norwalk, Conn.

Victor R. Browning, president of the Victor R. Browning & Co., Inc., Willoughby, Ohio, died recently.

MESTA Forgings

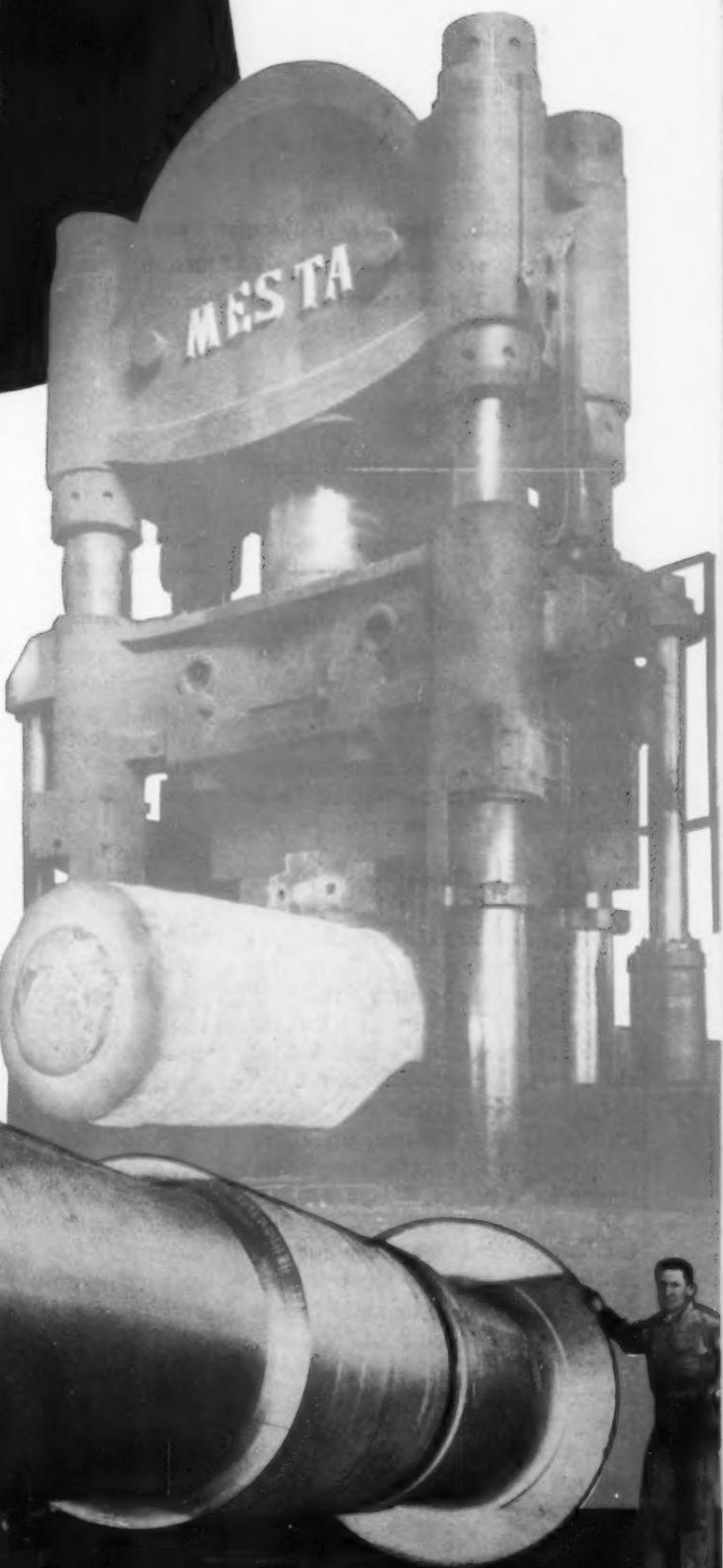
Mesta has facilities for the production—from raw material to finished product—of forgings in all sizes required by industry. Shown is a gigantic generator shaft, forged in a 6000-ton Mesta Press, and finished in the Mesta Shops.

Write for descriptive forging literature.

**DESIGNERS AND BUILDERS OF
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MESTA MACHINE CO.

PITTSBURGH, PA.



on the assembly line

automotive
news and
opinions

Republic Steel metallurgist sees
metal, ore shortages . . . SAE group
holds 3-day session in Detroit.



by Walter G. Patton

Look Into Future—The auto industry took a look into the future during the recent 3-day session of the SAE National Passenger car, body and materials group at Detroit. The program was well balanced, including outstanding papers on the new Chrysler engine, recent developments in dynamometers and instrumentation, passenger car safety and riding comfort.

Of special interest were papers on strategic materials, requirements of military motorized equipment and some recent tire studies by U. S. Rubber researchers.

Ore Transportation—E. C. Smith, chief metallurgist, Republic Steel Corp., took a critical look at the critical metals picture, including iron ore, coal and the several alloying elements.

He said there are no existing facilities to transport ore for 110 million net tons of steel ingots, despite movements by rail of more than 2 million tons of ore last year. No relief is in sight from foreign ores during 1951. Both Labrador and Venezuelan ores are some years away. Venezuelan ores may not cross the million mark for another 2 years.

Scrap Is "Disturbing"—Scrap will be a disturbing factor in 1951, Smith said. War production invariably interrupts the scrap cycle

and will have far-reaching consequences. An example: the ingot for a tank gun may be cast a year ahead of final inspection and acceptance or scrapping of the gun.

The scrap lag, Smith emphasized, is about three times as long as in peacetime. Inadequate power will also limit electric furnace steel output, Smith asserted.

Warning on Alloys—Smith's most serious warning concerned alloy steel. In 1945, he said, the jet engine program contemplated by Washington would have required substantially all the available nickel and low-carbon ferrochromium. About half of the available molybdenum would also have been used by this program.

In addition, the required amount of columbium, cobalt and tungsten exceeded the visible supply. Combat ended before this program got under way, Smith pointed out, so there has been no past experience with this critical alloy problem.

Manganese on the Wing—To illustrate further the grave ramifications of the alloy problem, Smith pointed out (1) in case of an all-out war, it may be necessary to fly manganese ore to this country from Africa, (2) U. S. consumes about 75 pct of the world's chromite but produces almost none, (3) columbium, a stab-

ilizer used in stainless steel, may be the most serious of all the alloy problems, (4) The U. S. lost a golden opportunity to stockpile nickel during 1949 when domestic consumption dropped 31 million lb compared with the previous year's demand.

Production Ratio—Another unfavorable trend is the relation of man-hours to production. The big auto firms, Smith says, turn out about 3 lb of car for 1 hr of wages. During World War II the ratio was 1 lb of tank produced per hr of wages. Under today's conditions, Smith does not look for more than $\frac{1}{2}$ lb of tank output per hr of wages, adding further to the critical manpower problem. But the U. S. may not have enough manpower or the will to work long enough to consume the material available, he suggested.

Copper Stocks Drop—Earl Smith's warning about steel and alloys was amplified by Richard J. Lund, supervisor of the Engineering Economics Div., Battelle Memorial Institute.

Copper stocks were drawn on heavily during 1950, Lund reported, dropping about 133,000 tons. Producers' stocks were down to 2 weeks' supply at year's end. The 1951 outlook is for a 10 pct increase in domestic production. Both scrap intake by producers

assembly line

Continued

and imports may be less than in 1950, he pointed out.

Aluminum Capacity—Domestic aluminum production may reach 1,200,000 tons in 1951, Lund believes, but stockpiling may take 150,000 to 300,000 tons, depending somewhat on the momentum of the aircraft program. By 1953 capacity should be well ahead of the World War II peak of 1,132,000 tons.

There's serious talk of boosting primary capacity to 1,700,000 tons. Canada also has ambitious expansion plans, so aluminum output in North America may double in the next 3 to 5 years.

Power Bottleneck?—Magnesium consumption increased 50 pct during 1950 to 27,000 tons. With the reactivation of six government plants, primary magnesium output may be boosted to 122,000 tons—about five times the present output but far short of 184,000 tons made available in 1943.

Power is the potential bottleneck here. By 1952 the Dow continuous rolling mill near St. Louis should be able to roll 3 million lb of sheet monthly, as compared with the total present rolling capacity of approximately 400,000 lb per month.

Tin Supply Inadequate—Lund sees trouble ahead with cadmium and cobalt. While available tin is being spread a lot thinner on cans these days, and tin content of can solders has been cut from 40 pct to 8 pct, world consumption has been in excess of production for several years.

Nonferrous Not Encouraging—The broad conclusion reached by the Battelle engineering economist is that, except for aluminum and magnesium, the outlook for nonferrous metals is not encouraging. The U. S. would undoubtedly be in much better shape today so far as domestic output of critical and strategic materials is concerned, he continued, if the

"fiscal climate" of the past decade had been more conducive to taking long term risks in the long-shot game of mineral exploration and development.

Must Fit Doors, Ramps—A new dimensional requirement has placed further limits on equipment designed for the military. Height and width of many wheeled vehicles are limited by the door size of planes or the ramp opening of the landing barge. Accessories like spotlights and ventilators may not increase overall dimensions. The length of an ambulance is fixed by the length of the standard Army litter. These are all new problems for engineers working on military vehicle body requirements.

As pointed out by Capt. J. L. Quinnelly, U. S. Army Ordnance Corps, Detroit Arsenal, vehicle bodies are being designed so a switch from wood to steel construction will be possible if steel is unobtainable. Another limitation is severe climate requirements.

More New Needs—Other new requirements include: (1) deep

water fording, requiring provisions for air intake and exhaust, (2) winterization, (3) insulated floors and personal heaters for arctic enclosures, (4) ground mine protection to prevent injury to personnel by land mines, (5) armored cabs to replace the standard cabs.

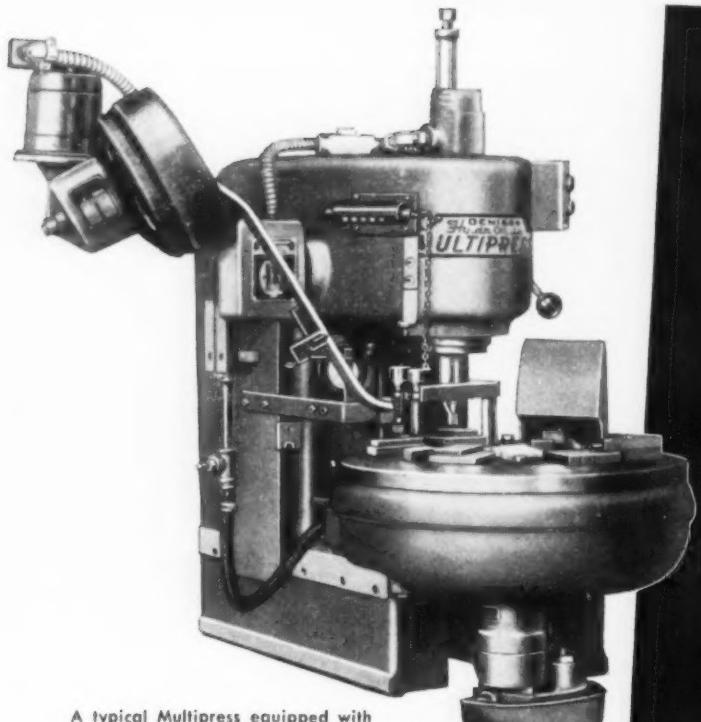
Wider Cars for Caution—H. L. Gandelot, of General Motors Corp., has indicated wider automobile bodies have the favorable psychological effect of inducing drivers to allow more room for passing. He argued that the overhang of longer bodies has the effect, in collisions, of functioning as a shock-absorber. Front-end metal crumples and crushes, absorbing much of the impact.

Titanium for Defense—What the commercial development of titanium and its alloys may mean in the defense effort was suggested by Col. B. S. Mesick, Chief, Research and Materials Branch, Ordnance Dept., who pointed out that successful substitution of titanium alloys for steel armor could reduce weight about 40 pct.

THE BULL OF THE WOODS

By J. R. Williams





A typical Multipress equipped with a six-station indexing table, special tooling and hopper feed, used to rivet electrical contacts on brass and spring steel contact arms.

MULTIPRESS
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**FASTER
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More than six-thousand Multipresses now offer working proof of this ability to speed production, improve quality, reduce rejects and scrap losses, increase safety, cut worker fatigue, reduce die wear, and slash costs.

A quick review of a few Multipress features will show why!

Pressure is infinitely adjustable, within the full pressure range of the press.

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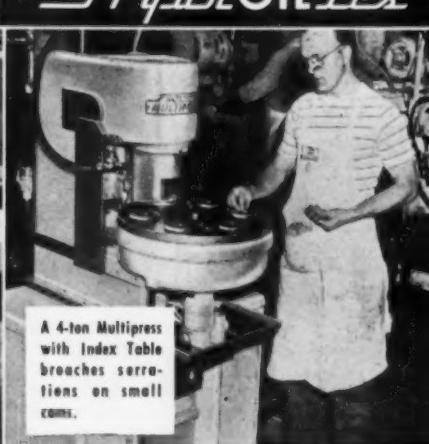
Indexing tables and dial feed tables for feeding parts to the press ram automatically, are standard Multipress accessories. Others include harmonic stock feed, straightening fixtures, pelleting equipment, and a foil marking attachment.

Multipress is tailored to individual production needs, in eight different frame sizes, with capacities from 1 ton up to the 50-ton range. For more information, write The Denison Engineering Company, 1158 Dublin Road, Columbus 16, Ohio.

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6-ton Multipress used by famous radio maker in producing speaker assemblies.



A 4-ton Multipress with Index Table broaches serrations on small cams.



A 25-ton Multipress with Index Table assembles screws in insulator bases.

west coast progress report

*digest of
far west
industrial
activity*

by R.T.Reinhardt



About Face on Power — Although a year ago Bonneville Power Administration officials painted a black picture of available power for industries in the Pacific Northwest, they now contemplate supplying 300,000 kw of power to some new aluminum reduction plants. Alcoa would like a plant near Wenatchee or possibly Grand Coulee, and Eastern Metal Products Co. has been surveying sites in Washington.

Alcoa would need 120,000 kw of firm power and 60,000 kw of interruptible power and Eastern Metals would need about 120,000 kw of firm and interruptible power combined. Alcoa would probably be supplied by additions to facilities at Rock Island Dam and Eastern by sources other than the BPA—possibly steam generation plants.

Speed BPA Projects? — Additional loads may require speed-up of several BPA projects now under construction or proposed. Assuming normal or average precipitation, power supply will be critical until 1955. A power tie-in between Oregon and California is expected to be completed in late 1952 and will add 100,000 kw to the Bonneville grid.

Troy Manufacturing Co., made up of a group of small eastern aluminum fabricators, still hopes it too can establish an aluminum reduction plant near Bellingham, Wash., which probably would be

supplied with electricity generated in a steam plant.

Good News for Seattle — Announcement that a production contract was being given Boeing Airplane Co. at Seattle to produce the B-52, a heavy jet bomber, has given a lift to the entire city.

The Seattle plant of Boeing lost the production on the B-47 to the inland plant at Wichita, Kansas, and there was some uncertainty as to future contracts in the Northwest plant. The B-52 is similar to the B-47, but much larger. While never flown, the B-52 is expected to have a speed in excess of 500 mph, combat altitude above 55,000 ft and a range of 10,000 miles.

Signs of the Times — Major metal sash and door plants in Seattle will have to close by June 30 unless they are allocated metal or receive defense contracts it was reported in a meeting of representatives of labor, industry, and metal manufacturing firms last week.

NPB's curtailment on use of aluminum and steel in such products is responsible for the anticipated shut-downs which will directly affect approximately 300 employees in five major firms.

Will Close Warehouse — Another result of the steel shortage is the abandonment by Bethlehem Pacific Coast Steel Corp. of its mill warehouse in San Francisco. This struc-

ture which has four acres under roof was built in 1946 but there has been but little opportunity to use it for its original purpose.

Most of the sprawling building is devoted to the warehousing of food stuffs, tin cans and miscellaneous commodities under lease. Fully equipped with heavy duty cranes and served by two spur tracks, the structure is now up for sale.

Defense Pool Formed — Pacific Defense Industries has been organized to pool resources of plants in California, Oregon and Washington to facilitate procurement and handling of war defense contracts.

The organization states that it will assume full responsibility for the completion of contracts, allocate work to plants best equipped to perform various portions of the work and will handle sale and contract negotiations with the government and other prime contractors.

Scrap Situation Bad — Scrap buyers in the West continue to pay ceiling prices for No. 1 heavy melting and in many cases find on delivery they have bought No. 2. Buyers are becoming increasingly bitter.

Dealers contend they are making every effort to comply with grading practices but that the amount and the quality of material they are able to collect is none too good and their handling costs are stiffer than ever before.

Presenting: A NEW HOT WORKING DIE STEEL
FOR PRESSES AND UPSETTERS—

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PRESS DIE INSERT



PRESS DIE



UPSETTER DIE

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The makers of Hardtem—first prehardened die block for drop hammer forgings—now introduce "Prestem", a new steel analysis developed especially for the hot working of steels in forging presses and upsetters.

Prestem is available in the form of blocks and bars for solid press dies, insert dies, upsetter dies, and punches. It machines readily at high hardness . . . has high impact resistance . . . can be water cooled during forging operations.

Results obtained the past year by three large automotive forge shops indicate that Prestem dies withstand abrasion and wear at high temperatures . . . resist heat checking during long runs . . . continually produce better quality forgings.

The same steel can be obtained in the annealed condition and is distributed under the trade name Presneal. Write for the Prestem folder or call your Heppenstall representative for more information. Heppenstall Company, Pittsburgh 1, Pa. Sales offices in principal cities.

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March

the federal view

*this week in
washington*

by Eugene J. Hardy



No Public Scrap Drive—There may be an NPA-sponsored scrap drive of sorts this year, but it won't be aimed at the general public. NPA is now trying to get the facts on how much of a scrap deficit is in prospect for this year but the question to be answered is where and how to get it.

A public drive brings shudders to those in NPA who would be responsible for such a program, although there are some who feel that such a drive would serve to make the public mobilization-conscious. Householders were pretty well cleaned out during the last war and would have little to contribute to piles of bed springs, pots and pans, and bird cages which would do little more than provide eyesores in public squares.

Four Major Sources—Current efforts to bring in more scrap are being directed to the auto wreckers, municipalities (old trolley rails, bridges, etc.), and the reserve of World War II ships. Farmers will also be included.

NPA says industry could help a great deal, without any government compulsion, if plant managers would only dig out their copies of WPB's salvage manual and follow through on the suggestions it contains.

Current suggestions for a public drive for collection of tin cans, sparked by the Senate Preparedness Subcommittee isn't favored by NPA. NPA points out that tin

in tin cans has been heavily reduced and existing de-tinning capacity would provide only about 175,000 tons of steel scrap annually.

Less Warehouse Steel—Contrary to reports that more steel will be made available from warehouses, the opposite is true. The reason is that warehouses must bear the brunt of an expected flood of DO-97's under the recently established MRÖ program.

However, NPA is trying to work out a program under which warehouses will not be caught short during the beginning stages of CMP. A revision of the aluminum order is also in the cards to assure a better flow from mills to distributors and jobbers.

Ban on Contract Info—The small firm's best source of information for subcontracting leads would be extinguished if security-minded officials in the Dept. of Defense have their way and discontinue weekly listing of contract awards issued by Commerce Dept. field offices. THE IRON AGE publishes a weekly summary of these listings covering contracts in the metalworking industry.

Under military proposals which have already been put into effect, the firm name and product are being released but the quantity and dollar value of awards are eliminated. This greatly reduces the value of this service.

Steel Case Winding Up—The Federal Trade Commission's 3½-year price fixing charge aimed at the steel industry may be drawing to a close. Negotiations between steel attorneys and FTC have resulted in a second proposed cease-and-desist order which the industry has agreed to accept. This order was presented to FTC this week.

Unlike the first proposal, turned down last year, the new order does contain such findings and is likely to be accepted by the Commissioners.

To Defy Analysis—This would seem to end the freight absorption question, but the order would not stop FTC from proceeding with its theory of "conscious parallelism of action" which would make individual compliance with the order so thorny a problem as to defy analysis. Seemingly, it would be a difficult problem for two or more firms to absorb freight in the same amount to the same area and still stay within the limits of the proposed order.

The proposed order would also bar any fixing of prices; exchanging of price lists; publishing and distributing freight rate books; agreeing on classification of customers; and the use of the multiple basing point system. In addition, all producers would be required to sell f.o.b. mill to any customer.



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stainless exactly to order and deliver it promptly. So, for complete stainless service, call your nearby Ryerson Plant.

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Schedule 40—Standard Weight—Seamless & Welded
Schedule 80—Extra Heavy Weight—Seamless

TP316 PIPE Schedule 5—Light Wall—Welded
Schedule 10—Light Wall—Welded
Schedule 40—Standard Weight—Seamless & Welded

TP347 PIPE and/or 304 ELC... Schedule 5—Light Wall—Welded
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Schedule 40—Standard Weight—Seamless & Welded
Schedule 80—Extra Heavy Weight—Seamless

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RYERSON STEEL

COLD EXTRUSION OF STEEL

Effect of lubricants, tool contours and reductions

By HUBERT HAUTMANN

Translated from Archiv fur das Eisenhuttenwesen, August 1950

By W. M. Baldwin, Jr., Research Professor
Case Institute of Technology, Cleveland

The cold extrusion process is one of the discoveries born of the unconventional thinking of a man working outside his field. In 1935, A. Liebergold (German Patent 717679) of the Neumeyer Metal Works in Nuremberg ran a mild steel blank through the same tool setup used for the deep drawing of cartridge cases from 0.600-in. thick brass. The results were surprising and certainly no so hopeless as a steel man would have expected. To be sure, the drawn part had heavy cracks and was galled, but the finished article was successfully produced.

It was recognized that a suitable lubricant had only to be developed to repress the galling and the process would be a practical one. The discovery of phosphate coats—put on by the Coslett method—as a lubricant or lubricant carrier filled this need. From 1938 on, the Neumeyer process developed rapidly on a broad scale. It was used to finish form component parts, especially hollow shells with thick bases and thin walls. It was used also in producing tubular products with changing cross-sections. Later Bonderizing took the place of Coslettizing.

The process consists of effecting a heavy reduction in cross-section of a draw piece by extruding cold metal through a die with a punch. Various

forms of this basic method are shown in Fig. 1. This schematic diagram illustrates the arrangement of tools (die and punch) and the workpiece. The extrusion occurs either in the direction of the movement of the punch (Figs. 1a, b, c) or in the opposite direction (Figs. 1d, e) or in both directions (Fig. 1f). The cross-sections of the extruded parts are generally round, although ovals and polygons with rounded corners can be pressed. Articles with sharp corners cannot be produced. Sharp corners crack, since lubricants fail at these points. Parts which are difficult to form can be produced with segmented dies.

Minimum Wall Thickness Given

The minimum wall thickness of extruded cylindrical cross-sections and tolerances for various diameters are shown in the box. Extrusion pressures for a 75 pct reduction in cross-sectional area, for a low-carbon steel using a conical die with a 125° apex angle will go as high as 170,000 psi, calculated on the basis of the punch area. Tool life depends, of course, on the tolerances to be held, although 50,000 to 200,000 pieces are common. Hard chrome plating has been necessary on occasion. Until now, steels with carbon running from 0.06 to 0.3 pct and tensile

This summary of the latest information on the Neumeyer process shows that certain phosphate coatings are as good as the best electrolytic porous metallic coatings of zinc. Die apex angles from 40° to 180° have been tested. Small die angles gave lowest extrusion pressures and best metal flow. Tool contours were studied in extruding 25 different steels. Transverse toughness of steels reduced 85 pct are much higher than expected.

Cold extrusion—Neumeyer process

Continued

strengths of 50,000 to 75,000 psi have been extruded; the greater portion of production has been run on 0.06 to 0.12 pct C steels.

The effects of the lubricant, tool contour and the steel used for the workpiece on the extrusion pressure were studied. Further experiments covered the properties of the cold extruded steel. The first group of experiments was carried out on a 75 metric ton hydraulic press fitted with a manometer, and having a punch velocity of 10 ipm. The force-distance curves were obtained on a stylus recorder coupled to both the punch and the manometer. The dies were sometimes finished in one piece and sometimes split in two pieces to allow removal of the pressings at any arbitrary stage of the forming process. Die apex angles were varied over the range of 40° to 180° usually at the following preferred values: 40°, 90°, 126° and 180°.

Reduction of Area Studied

Solid rounds were extruded with different reduction through a die with a 110° die angle. Rounds with 70, 64, 56, 52 and 48 pct reduction in area were pressed from the same sized blank through different dies. Two experimental extrusions with a 90 pct reduction in area were made through a die with a 126° die angle. The starting diameter of the blank was 0.8 in., the extruded diameter was 0.23 in. The extrusion pressure on the punch was 250,000 psi.

Lubricants play an important role in cold extrusion. The lubricant must not only repress galling, but it will strongly affect the extrusion pressure. Lubricants normally used in drawing

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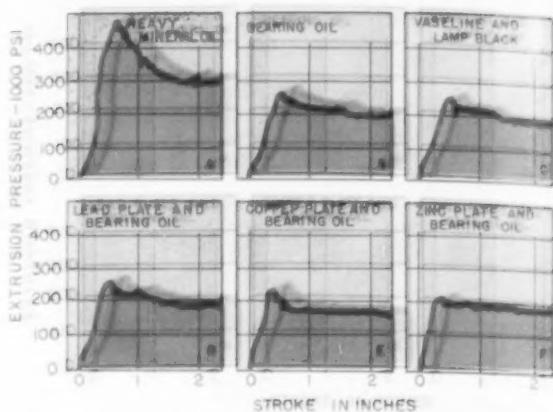
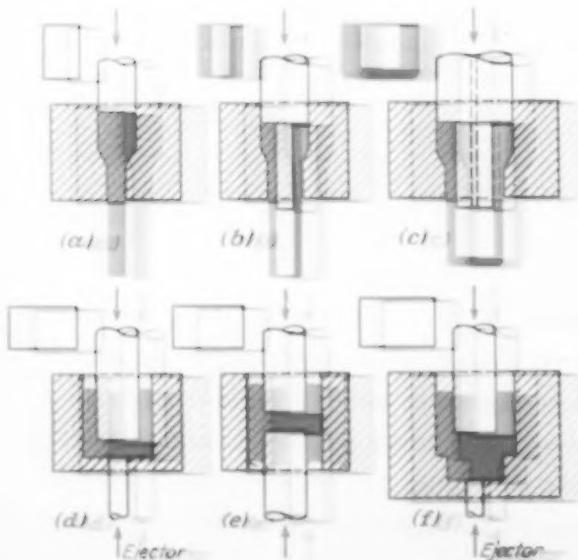


FIG. 2.—Effect of different lubricants on the pressure in cold extruding tubular test pieces (0.78 in. OD, 0.078 in. wall) with 75 pct reduction in area in a 126° die.

steel do not stand up at higher reductions. Tests made with soap-type or grease-type lubricants such as bearing oil, wool oil, vaseline and talc failed as well as those made with heavy mineral oils. Above all, the fatty lubricants failed on dies warmed up by continued extrusion. Improvement of the lubricity of oils can be obtained by adding lampblack or graphite, but hardly to a degree to permit practical exploitation.

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Effect of Higher Temperatures

The success obtained with Bonderized phosphate coating in cold extrusion has led to its use in cold drawing of wire, rods and tubes. Metallic and salt lubricants have the advantage in that they do not lose their effectiveness with the increase in temperature that invariably occurs at the tool surfaces during forming.

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ally to what appears to be a constant minimum value.

The effectiveness of the lubricant was judged from the value of the extrusion force (minimum). Heavy mineral oil gave an extrusion pressure of 280,000 psi for a plain 0.05 pct C steel tube extruded 75 pct reduction in area on a cold die. Bearing oil on a bare surfaced blank dropped the extrusion pressure to 200,000 psi all other conditions being the same. Vaseline with 30 pct lampblack added dropped the extrusion pressure slightly though the starting pressure remained unchanged. On warm dies (results now shown) the effectiveness of the latter two lubricants fell off badly. On a die warmed to 300°F the bearing oil or vaseline with 30 pct lampblack gave pressure-stroke charts similar to that obtained with heavy mineral oil on a cold die.

Examples of the behavior of metallic lubrication for the same experimental conditions are given in d, e and f of Fig. 2. Extrusion made with copper or zinc-plated surfaces with supplemental oil lubrication gave the lowest extrusion pressures. Lead plated surfaces with additional lubrication required higher pressures. The advantage of metallic lubricants did not consist alone in the fact that they gave extrusion pressures that were lower than obtained with grease-type lubricants, but that the pressure-stroke diagrams shown in Figs. 2d, e and f remained unchanged for dies at higher temperatures.

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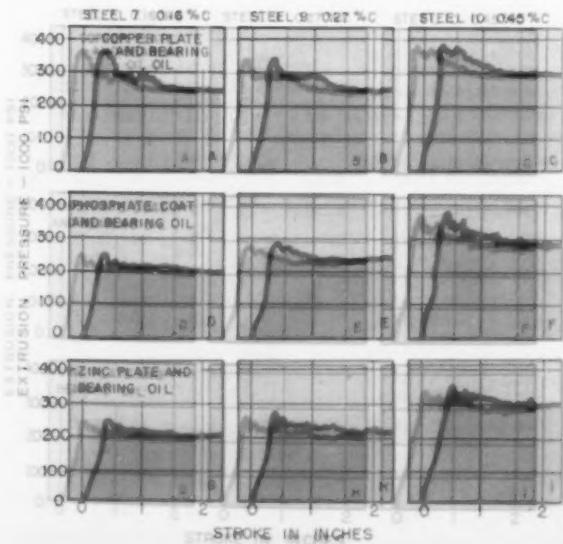


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Articles extruded with a phosphates surface take on a light gray sheen, while those extruded with copper plate or zinc plate become mottled. A suitable surface finish is obtained only with heavy plating. Phosphate coats are most easily removed by pickling. This is a distinct advantage over zinc plate which is quite difficult to remove in finishing operations.

Further experiments on the effect of copper, zinc, and phosphate coatings on extrusion pressure are given in Fig. 4. A number of steels with carbon contents ranging from 0.04 to 0.57 pct were extruded to tubular shapes through a die having a die angle of 126°. The reduction in area was 80 pct. The final tubes were 0.8 in. ID and the tube wall was 0.017 in. The extrusion pressures increase with the carbon content of the steels. The slight upward jog in the curves at 0.33 pct C may be attributed to the fact that below this carbon content the steels were not killed while above this value they were killed. Except for this discontinuity, the extrusion pressure increases almost linearly with carbon content. This experimental series also shows how copper plate gives the highest extrusion pressure and zinc plate the lowest.

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Continued

strengths of 50,000 to 75,000 psi have been extruded; the greater portion of production has been run on 0.06 to 0.12 pct C steels.

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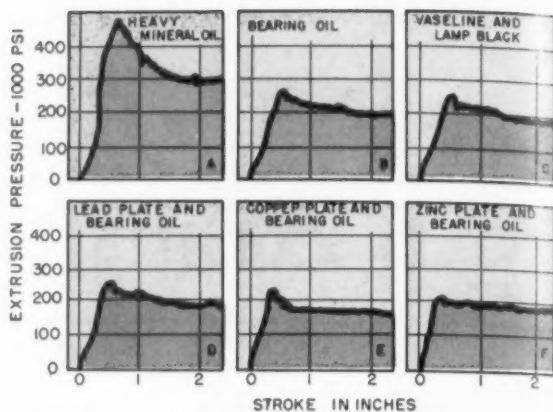
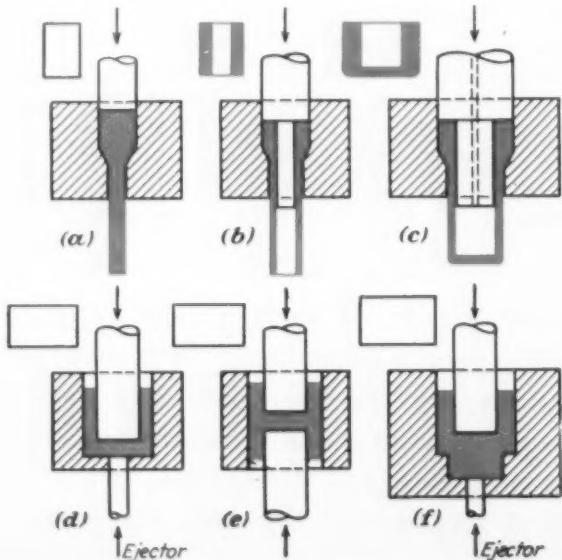


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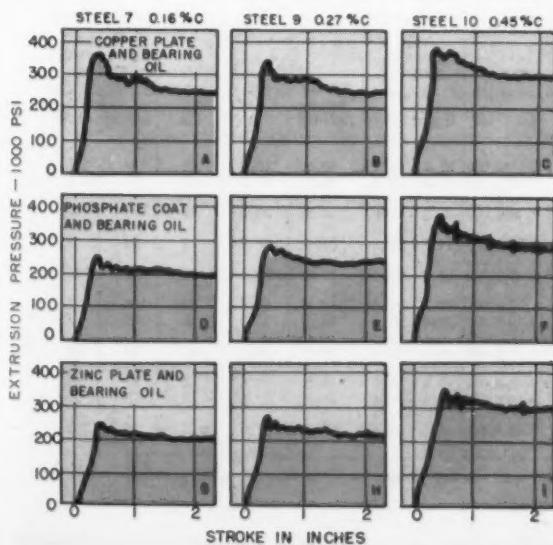


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Continued

Whereas internal rupturing virtually sets the limit of drawing, it is rarely found in extrusions.

Experiments on the effect of the die angle show that the lowest extrusion pressure and the most favorable metal flow are obtained with dies with the smallest die angles. On the other hand, the stressing of the dies, from radial pressure exerted by the workpiece, is greatest at low angles and the danger of fractured dies becomes a problem. The most commonly used die angle in practice is between 125° and 130° and was chosen with regard to the stressing of the die itself. Extrusion pressures and the properties of the extruded steel were secondary considerations.

Insertion of dies in tougher die rings should be made as complete as possible to insure them against failure. This permits smaller die angles and therewith lower extrusion pressures and better properties in the finished part.

An experimental series, illustrating the above facts, was carried out on 25 different steels of which 11 of the more important are listed in Table II. Here are listed the chemical composition, the tensile strength and the impact strength, in both unaged and aged conditions, of rimming, killed and aluminum-bearing plain carbon steels as well as free-machining steels. Carbon contents ran between 0.08 and 0.50 pct, tensile strengths between 50,000 and 110,000 psi. Blanks 1.5 to 4.0 in. diam were turned down from rolled rod and then normalized. The aluminum-killed steels were cooled in air from the normalizing temperature at better than 10° per min on passing through the A₁ point. They behaved nonaging when deliberately put through aging conditions.

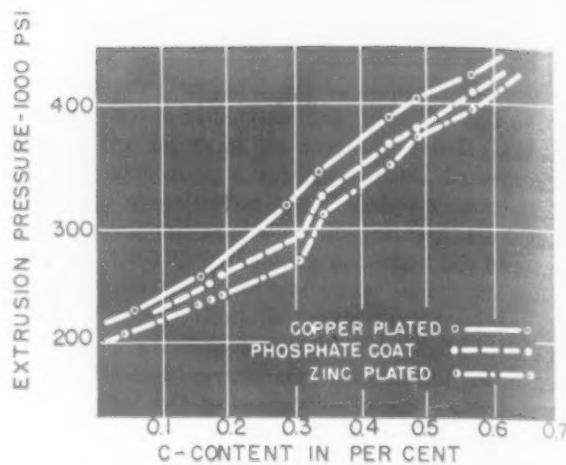


FIG. 4—Extrusion pressure as affected by lubricant and carbon content of the steel. Tubes with 0.78 in. ID and 0.11 in. wall were extruded with a reduction in area of 80 pct.

Steels 1 and 8 correspond to the softest and hardest aluminum-containing special steels that could be used commercially. For milder extrusions, steels 2 and 7 were chosen. The free-machining steels 5, 6 and 9 are of interest for combined production methods (extrusion and machining), but are not used in large quantities. Plain carbon steels 10 and 11 with 0.45 and 0.50 C pct are used in small quantities, too.

Killed Steel Most Sensitive

The experiments were carried out on dies with 40°, 90°, 126° and 180° angles. Blanks 0.8 in. diam were extruded with 65 pct reduction in area to rounds 0.464 in. diam. Blanks were Bonderized and given supplemental lubrication. Vickers hardness tests on the cross-section and Izod impact strength were taken on the parts as cold extruded and as aged 1 hr at 250°C.

TABLE II
STEEL ANALYSES AND MECHANICAL PROPERTIES

Running Number	Designation	Diameter or Thickness, inches	Heat Treatment	Chemical Composition								Yield Strength, 1000 Psi	Tensile Strength, 1000 Psi	Elongation, L=5d Pct	Reduction in Area Pct	Impact Strength ¹ , Ft.-Lbs.			
				C	Si	Mn	P	S	Al	Cu	Ni					Unaged	Aged ²		
1	Ma 8	1.5	Normalized	0.08	0.07	0.33	0.019	0.022	0.059	0.11	0.006	35.6	34.2	50.0	40.0	75	122	110	
2	MK 7	1.5	Normalized	0.10	Trace	0.41	0.025	0.033	.....	0.13	0.006	29.4	29.4	51.0	37.0	62	90	5	
3	Non-aging	Boiler Plate I	1.5	Normalized	0.09	0.10	0.53	0.024	0.032	0.025	0.14	0.007	31.8	31.8	52.5	39.0	64	106	65
4	Killed	Boiler Plate I	1.5	Normalized	0.11	0.10	0.45	0.020	0.032	.....	0.12	0.009	34.2	32.8	55.	37.0	70	95	7
5	15 S 20	1.5	Normalized	0.11	0.10	0.45	0.020	0.032	.....	0.12	0.009	34.2	32.8	55.	37.0	70	95	7	
6	Non Aging	Manganese free-cutting steel.	1.5	Normalized	0.12	0.22	0.68	0.035	0.138	0.054	0.15	0.009	37.8	37.8	60.5	32.0	53	82	40
7	CK 15	1.5	Normalized	0.12	Trace	1.43	0.026	0.148	.....	0.14	0.008	40.0	40.0	61.5	28.0	44	105	25	
8	Non-aging	Boiler Plate IV	1.5	Normalized	0.16	0.12	0.48	0.028	0.032	.....	0.12	0.007	42.5	41.4	63.0	30.5	55	90	7
9	Non-aging	free-cutting steel.	1.5	Normalized	0.24	0.28	0.50	0.041	0.029	0.040	0.11	0.006	45.6	41.4	71.8	29.2	58	82	50
10	C 45	3.02	Normalized	0.45	0.24	0.80	0.043	0.031	.....	0.10	0.007	55.0	55.0	96.0	31.0	57	71	52	
11	T 45 Thomas	Rail Steel	3.02	Normalized	0.50	0.20	0.90	0.059	0.026	.....	0.06	0.016	60.5	60.5	110.0	17.5	30	4.5	3.5

¹—These data were obtained with a DVM-Test specimen and reported in kilogram-meters/square centimeter. The reported values have been multiplied by 6 which converts DVM readings to Charpy values reasonably well.

²—Compressed 10 pct., annealed 1/2 hour at 250°C. Notch perpendicular to surface.

The experimental results are given in Fig. 5. The extrusion pressure and Vickers hardness increase in the case of every steel as a larger die angle is used. The impact strength drops, however, especially in the case of the harder steels. The steel most sensitive to changes in die angle is the killed steel specially prepared for cold extrusion (steel 1).

The extrusion pressure increases with increasing strength of the steels. The ratios of extrusion pressure to lower yield strength and extrusion pressure to tensile strength are collected in Table III for the four different die angles and can be used to interpolate the extrusion pressures required with any die angle. The average pressure required to extrude a blank 65 pct through a die having an angle of 126°—the angle most commonly used in practice—is 5.1 times the lower yield strength of 3.1 times the tensile strength of a normalized steel. The ratio drops with harder steels.

Effect of Die Angles on Hardness

For the 65 pct reduction, the hardness is 5.5 to 6 times the value of the tensile strength when a 126° die angle is used. With the smallest die angle, 40°, the hardness number lies between 4.5 and 5 times the tensile strength. Increasing the die angle from 126° to 180° does not affect the hardness very much.

The impact strength values of the extruded parts are extraordinarily high. In the case of steels 10 and 11, the starting impact strengths are exceeded, in all other cases the toughness of the artificially aged tests (Table II) is reached.

The effect of relief annealing after the extrusion, 1 hr at 480°F, on the impact strength of the extruded rods is not clear. Undoubtedly the values are affected by relief of residual stresses. Only in this manner can the many cases where the toughness of the aged steels exceeded that of the untreated steels be explained. Impact strength like hardness is affected most strongly by the die

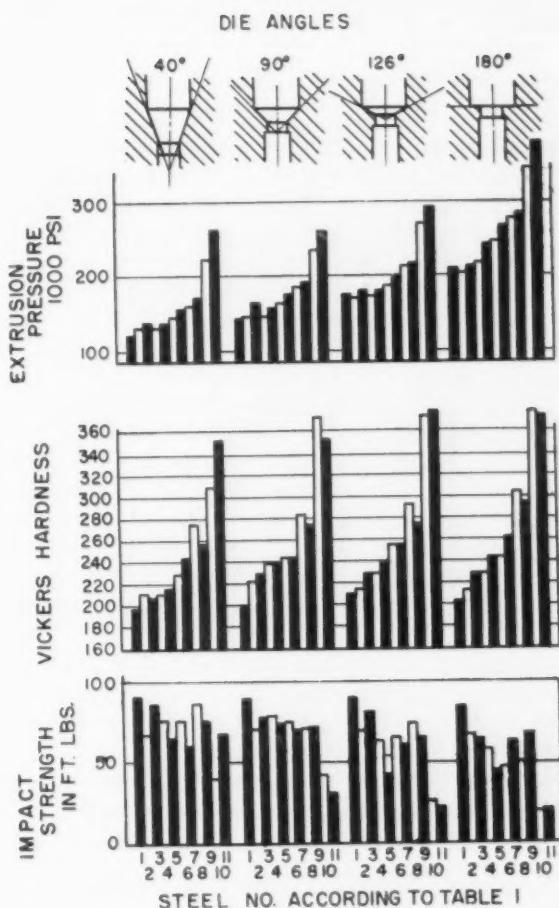


FIG. 5—Effect of die angle on the extrusion pressure, hardness and impact strength of 4.6 in. cylinders extruded with 65 pct reduction in area from the different steels in Table II. The blanks were Bonderized.

angle changes in the neighborhood of 90° to 126°.

The same 25 steels used in the previous experiments were studied to determine the effect of area reduction on extrusion pressure and on impact strength. Fig. 6 presents the results

TABLE III
EXTRUSION RATIOS v. DIE ANGLES

Ratios of extrusion pressure to lower yield strength and to tensile strength for extruding rods (0.465 in.) of various steels (see Table I) through dies having different die angles.

Number	Steel Designation	Extrusion Pressure				Extrusion Pressure			
		Ratio	Lower Yield Strength			Ratio	Tensile Strength		
			Die Angle in Degrees				Die Angle in Degrees		
		40	90	126	180	40	90	126	180
1	Ma 8	3.5	4.2	5.1	6.2	2.4	2.9	3.5	4.2
2	MK 7	4.5	5.0	5.8	6.8	2.7	2.9	3.3	4.0
3	Non-aging Boiler Plate I	4.4	5.2	5.7	6.7	2.6	3.1	3.5	4.0
4	Killed Boiler Plate I	4.0	4.5	5.3	6.7	2.4	2.7	3.2	4.0
5	18 S 20 Non-aging	3.8	4.4	4.8	6.6	2.3	2.6	3.0	4.1
6	Manganese free-cutting steel	3.6	4.1	4.7	6.2	2.3	2.7	3.1	4.0
7	CK 15	3.8	4.2	4.8	6.5	2.4	2.8	3.2	4.2
8	Non-aging Boiler Plate IV	3.9	4.5	5.2	6.8	2.3	2.8	3.0	4.0
9	Non-aging free-cutting steel	3.8	4.1	4.7	6.1	2.3	2.8	3.0	3.9
10	C 45	4.1	4.3	5.0	6.3	2.3	2.5	2.9	3.6
11	T 45 Thomas Rail Steel	4.3	4.3	4.9	6.4	2.3	2.4	2.7	3.5
	Average	3.9	4.4	5.1	6.5	2.4	2.7	3.1	3.9

obtained on the 11 steels listed in Table II. For these experiments dies with 126° die angles were used; 0.4-in. diam rods were extruded; the blanks were Coslettized. As the extrusion pressure increases almost in direct proportion with the reduction in area for each steel the pressure is higher for the harder steels.

For purposes of calculating the extrusion pressure, the ratio of extrusion pressure to tensile strength is the better, since it shows less scatter. In this experimental series as in previous ones, it was noticed that the extrusion pressure did not increase in direct proportion with the tensile strength. From all the data given above an empirical formula can be assembled for calculating extrusion pressures: Extrusion pressure (in psi) = (area reduction - 10) x 0.054 x tensile strength. The extrusion pressure determined for individual steels and at individual reductions lie very close to straight lines on a log-log plot. A grouping of the results for steels with 0.08 to 0.12 pct, 0.12 to 0.27 pct, and 0.45 to 0.50 pct C gives three straight parallel lines. These relationships originally determined on round rods are valid for the extrusion of tubes.

Aluminum Changes Extruded Properties

As may be seen in Fig. 6, the aluminum-killed and the nonaluminum containing steels behave differently as far as impact strength is concerned. In the aluminum-free steels, the impact strength is low at small reductions and increases at high reductions. The impact strength of the aluminum-killed steels on the other hand drops to a minimum in the range of reductions of about 50 pct. Beyond 75 pct reduction, the impact

Testing steels for cold extrusions

To test the formability of steel in different conditions or the relative formability of different steels a test in which a cylindrical specimen is pressed against a hole drilled into a plate. The hole has a diameter equal to one-half that of the test cylinder and a carefully rounded edge ($r = 0.010$ inch). The flattening of the cylinder and the depth of penetration into the drilled hole are measured at different stages of compression. These two quantities are determined continuously throughout compression with suitable instrumentation. The formability is expressed as a ratio of the flattening to the penetration. The exaggerated grain growth that occurs in the critical deformation range of 12 to 20 per cent is interesting.

strength almost equals the starting impact strength of the metal. Examination of the fracture surfaces shows that increasing cold work develops a fibrous structure in those areas where at lower reductions a coarse-grained brittle fracture was found. Fissures which appear in the heavily worked specimens cannot be detected in the micro-structure.

Transverse toughness test of a tubular body with varying wall thicknesses (average 0.060 in.) and 1.8-in. ID. The average reduction in area produced during extrusion amounted to 85 pct. The transverse impact energy runs about 40 to 80 ft-lb per in.² which is quite high for a tensile strength of 114,000 psi. After a 1112°F anneal the impact energy rose to 200 to 320 ft-lb per in.² at 83,000 to 106,000 psi tensile strength.

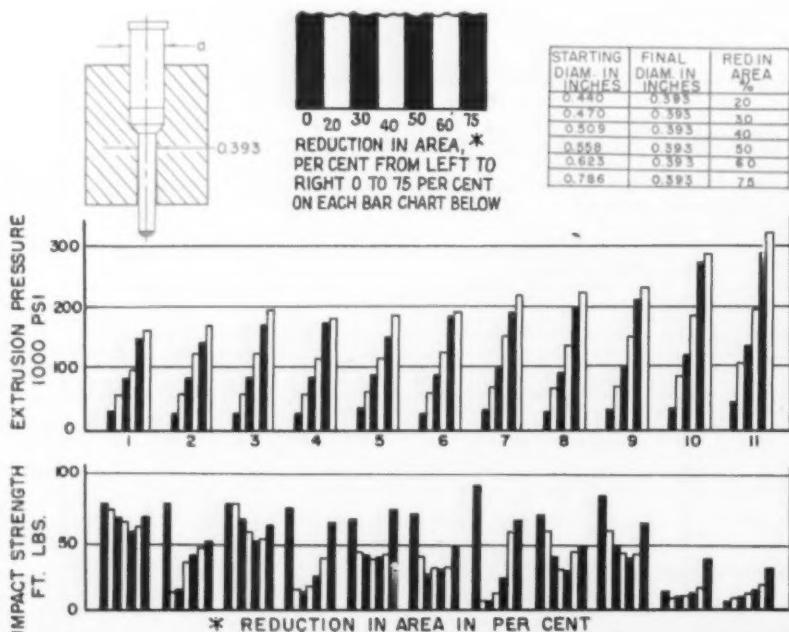


FIG. 6—Effect of type of steel (Table II) and reduction in area on extrusion pressure and impact strength. Final diameter of rods was 0.393 in.; die angle was 126°; the blanks were Coslettized. The bottom graph includes impact strength for zero pct reduction, while the top graph shows pressures for 20 to 75 pct reduction alone and does not include a sample for zero reduction.

AUTOMATIC TRANSMISSION CASTINGS CLEANED CHEMICALLY

By R. J. PETERS

Chief Metallurgist, Warner Gear Div.
Borg-Warner Corp., Muncie, Ind.



LOADING AND UNLOADING station for the Kolene unit. One carrier, holding 42 transmission cases, is lowered to working level with a section of load-carrying rail. Cases on pallet in foreground are stress-relieved and ready for loading.

IN launching the manufacture of an advanced form of automatic transmission for passenger cars, Warner Gear Div., Borg-Warner Corp., gave considerable thought to the problem of cleanliness so vital in the operation of an automatic transmission. For example, the transmission case, a gray iron casting of considerable design complexity, has many pockets and corners inaccessible to conventional cleaning or blasting methods. Yet it is imperative to have clean castings absolutely free from foundry sand.

Starting with this concept of absolute cleanliness, three major castings were selected—the transmission case, planet cage, and coupling—for chemical cleaning before machining. In addition, the transmission case is given an initial stress-relief treatment before cleaning to stabilize the structure and assure close dimensional tolerances in the machining stages.

The cleaning process selected for the purpose is an application of the well-known Kolene technique. Briefly, cleaning is done in an automatic cycle, self-contained unit using Kolene No. 4 reducing salt bath of the electrolytic type. Not

only does this process dissolve all sand in the pockets of the castings, it also dissolves all sand inclusions in the surface of the castings. Moreover, it has been found that Kolene removes rust and scale at the same time.

Another by-product of the process is that it serves as a positive means of checking casting quality. In the process of dissolving sand and removing rust and scale, this method of cleaning uncovers surface defects such as porosity and cracks, defects which ordinarily remain undetected until machining cuts are taken. This has a salutary effect on improving foundry practice, preventing loss of time and productive labor in machining.

Greatly Reduces Tool Breakage

Machinability has been greatly improved and tool life extended by the preparation of clean metal surface free from sand and scale. At the same time tool breakage, which can be responsible for shutting down a transfer machine line, is virtually eliminated.

The Kolene unit, developed in cooperation with

A new adaptation of the Kolene cleaning technique produces gray iron automatic transmission castings of unusual surface quality. Surface sand inclusions are dissolved, and all scale and rust are removed. Machine shop rejects are minimized, since the process uncovers porosity and cracks for visual inspection.

By C. H. YETMAN

Development Engineer, Heatronic Engineering
Holland Patent, N. Y.



INDUCTION HEATING SUCCESSFULLY SOLDERS

aluminum

Accurate temperature control is a "must" when soldering aluminum, and in the setup described here induction heating provided uniform heat diffusion and eliminated oxidation problems. A high-strength bond was obtained at a rate of 320 pieces per hr.

The most exacting requirement in soldering aluminum is the control of temperature, and the necessary accuracy is possible with induction heat. The surrounding work coil used in induction heating to produce the desired temperature does not cause excessive thermal expansion in 2S alloy. No distortion occurs and aluminum's rapid heat diffusion assists in producing the heat pattern developed to solder this alloy. Spot-heating, which cannot be avoided when irons or torches are used, greatly complicates the soldering problem and often necessitates complicated, expensive fixturing.

Results are uniform when induction heat is used. Variables are eliminated and the simplicity of fixtures that can be used to join small parts should indicate to design engineers the desirability of this newer method. The rapid

oxidizing characteristic of this aluminum alloy has always presented the major problem in solder applications. With induction heat, oxidation is accurately controlled, making it possible to produce a perfect bond in the soldered joint.

Using high frequencies in the range of 450 kc as a heat source, perfect soldering results are possible. These frequencies produce a heat pattern that blends with the low melting point, high conductivity and low resistivity of aluminum.

One successful application of the new process involves the joining of brass to aluminum, using 2S alloy. The parts consist of an aluminum name plate, to which are soldered two threaded brass studs. The soldering operation must not distort the piece, or affect the surface in any way that might be detrimental to finishing operations and the appearance of the finished plate. The

THIS ROTATING, 24-station table, with two induction heating coils, turns out 320 nameplate-and-studs assemblies an hour.



plate, brass studs, solder squares and the fixture used are shown on the back of a finished plate showing stud location.

Plate dimensions are $4\frac{1}{2} \times 2\frac{7}{16} \times 0.040$ in. Studs are $\frac{3}{8}$ in. long and have a 0.156 in. diam. Head diam is 0.355 in. The plate is both embossed and debossed and has a flange of varying depth, not exceeding $\frac{1}{4}$ in. around the periphery. With the plate in position for soldering, it extends over the ends of the fixture $\frac{1}{4}$ in. and at the top of the plate, where the flange is deepest, it is protected by Transite to a depth of $\frac{1}{8}$ in. On the opposite side, where the flange is shallow, the fixture extends beyond the plate $\frac{1}{8}$ in.

Fixture Prevents Burning

This fixture design protects the flange at its vulnerable points and prevents burning. The positioned plate touches the fixture at the top of the plate only, where the deepest part of the flange is located. Readied for soldering, it also rests on top of the two brass studs to which it is joined. This provides a three-point location, which satisfactorily maintains the correct position during soldering.

In loading the fixture the operator places the two studs in the holes provided in the fixture, threaded ends down. The head diameter of the stud provides sufficient surface for an excellent bond. At the points where the studs are to be soldered to the plate, there is no debossing and the surfaces are flat. Whenever possible, such an arrangement is desirable, since it usually results in a 30 pct saving in solder.

Specifications for the spacing of the studs are ± 0.005 in. Fast assembly-line production requires that this tolerance be held. Side wear in the stud holes, caused by the stud threads rubbing against them as the operator removes the nameplates from the fixture, made holding to the specification a problem at first. A method of regularly inspecting the soldered units was then set up. The operator checks one fixture for each revolution of the 24-position rotating table used for assembly and joining operations. An extra fixture was kept available so that the one requiring repair could be replaced without stopping the table.

Fixture Design Is Flexible

The stud holes are drilled in $7/16$ -in. diam Transite rod. These are pressed into holes provided in the fixtures. This design makes it possible to press out a worn bushing with a new one (see bushing at left in fixture, Fig. 1) and drill the new stud hole in a matter of minutes. This method of repair does not deteriorate the fixture or shorten its life.

Aluminum's rapid cooling characteristics also helps to maintain the specified stud spacing. The cooling of the plate and the hardening of the solder occur simultaneously. The characteristics of the 2S alloy respond to induction heating more readily than other metals. Molecular response to

high frequencies and the absence of stress during the heating cycle make it an ideal material for the process. Ordinary degreasing of the parts prepares them for induction soldering. A temperature rise of several hundred degrees above the solder-flow point eliminates all the difficulties experienced with oxidation when other solder methods are used.

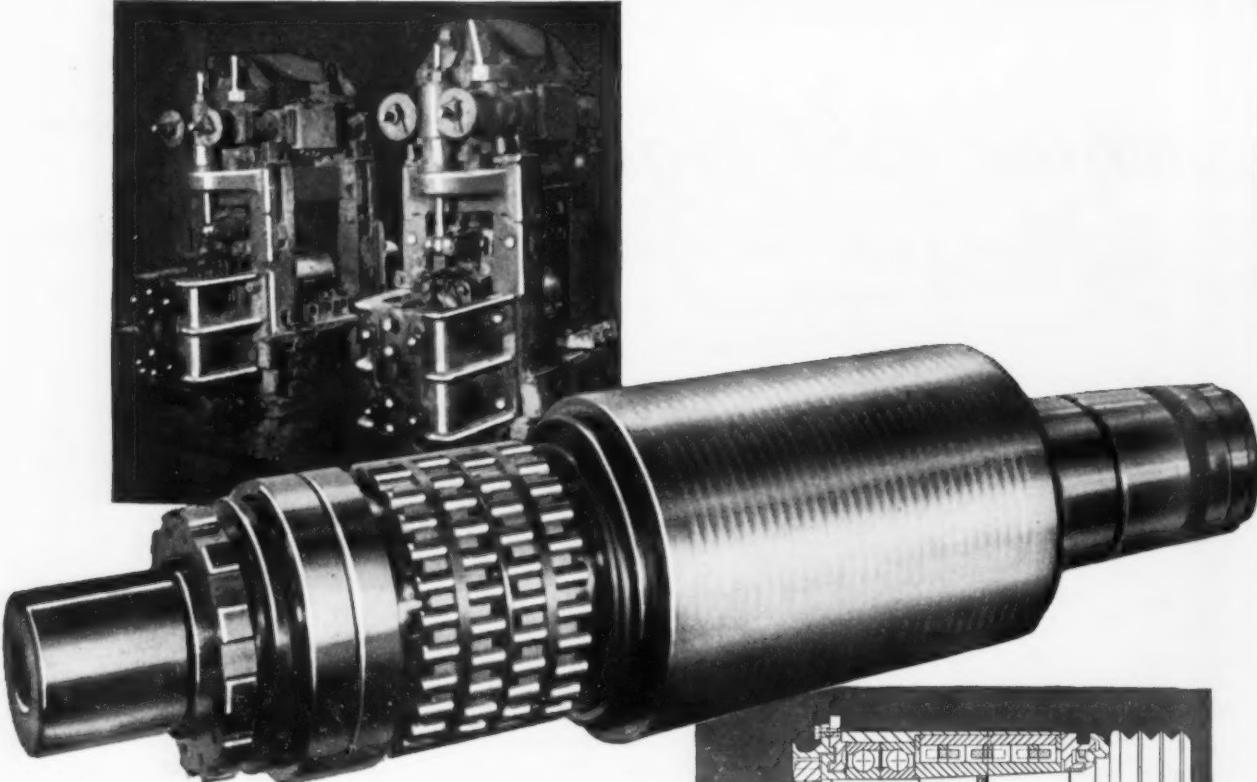
To produce this successful heat pattern two work coils are employed. Round copper tubing, $\frac{1}{4}$ -in. diam, is bent around a wood form rectangular in shape, $6 \times 4\frac{3}{8}$ in. Corner radii are $\frac{3}{4}$ in. and each coil has six turns. The proximity, or so called "coupling," of the work coil to the piece when in the heating position, is $\frac{1}{2}$ in. This is the dimension at the vertical centerline of the plate, while the coupling at the ends of the plate is $\frac{3}{4}$ in. Work coils of this size function best when the spacing between the coils, or turns, are held constant. This is accomplished by tying with asbestos or glass cord. Even better construction is provided by Transite corner posts. In the present setup, corner posts give an added advantage in the first heat stage. They absorb some of the current at these points of concentration, preventing too high a heat at the corners of the plate. In this first heat stage the greatest rise in temperature occurs. By raising the temperature only to an intermediate point in this first stage and then completing the heating process in a second work coil, a better bond and a higher production rate are obtained.

1000°F Maximum Soldering Temp.

At the end of the heat cycle in the first stage, the work coil rises and the table indexes to the second position. The work coil now descends, surrounding the fixture, and the heat is automatically turned on. Aluminum alloy 2S has an approximate melting point of 1220°F. This characteristic allows the use of temperatures up to 1000°F for the soldering operation. All oxidation is eliminated by this temperature.

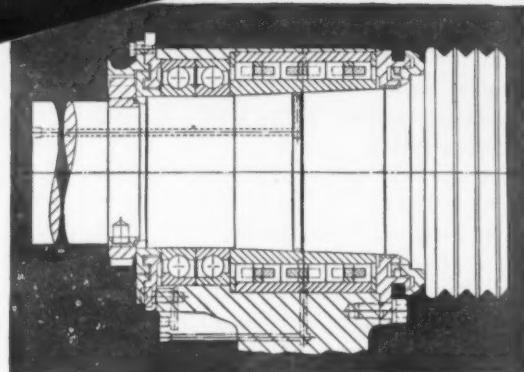
The solder used is 40 pct tin, 60 pct lead, made by the Farrelloy Co., Philadelphia. It remains solid to 400°F and is fluid at 460°F. Flux is very important and best results are obtained by using the flux recommended by the solder manufacturer. Removal of flux residue is accomplished by dropping the piece into a cold solution of 5 pct sodium bicarbonate. With this method, the pieces can wait indefinitely before further proceedings. Pieces which have been torch-soldered will corrode unless processed immediately. The hexagonal solder sticks, furnished by the manufacturer, are rolled to the correct thickness and cut to size, $\frac{1}{4}$ -in. sq x 0.020-in. thick.

During soldering, in both heat stages, pressure on the plate is necessary to assure a strong bond in the soldered joint. Since the plate rests on the studs and touches the fixture at one other point only, this pressure must be applied directly over the studs.



SHIFT AFTER SHIFT

*new roll neck mounting
increases production*



Now mounted on **SKF** bearings, the rod mills of a prominent mid-west mill increases production, shift after shift, and rolls three strands simultaneously. The new roll neck mounting, developed by **SKF**, is made up of a multi-row cylindrical roller bearing that carries the rolling load and angular contact ball bearings for axial stabilization of the rolls—working as a unit. It takes only a minute to mount or

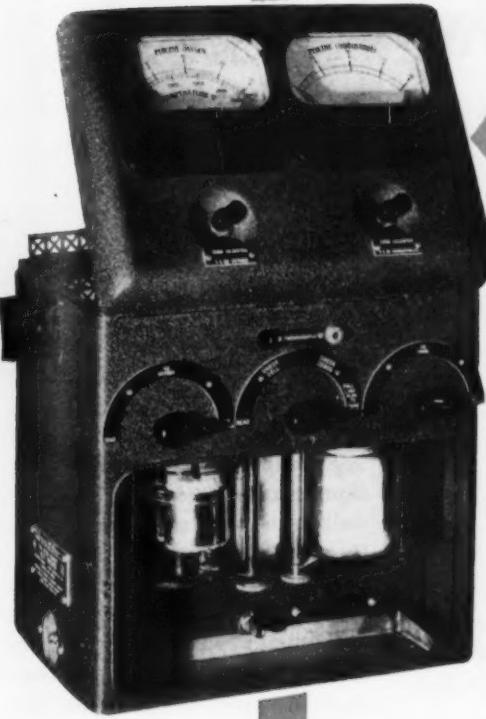
dismount the bearings and chucks as a unit during roll changes—thanks to **SKF**'s oil injection method. Continuing research, rigid adherence to high manufacturing standards and strict quality control are your assurance that **SKF** can help you design for greater efficiency, effective performance.

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Steel Castings Booklet

Titled "The Steel Casting Industry," a new 24-p. booklet lists seven prime reasons, aside from economy, why virtually all types of manufacturing industries are making increased use of steel castings for a great variety of finished products. Particular emphasis is directed to the steel casting industry's extensive research and product development activities covering a vast range of engineering and mechanical applications. The booklet serves as a handy guide for engineers, management executives and students. *Steel Founders' Society of America.*

For free copy insert No. 1 on postcard.

Gray Iron in Defense

The importance of gray iron castings in a wartime economy is emphasized in a new 4-p. folder intended for distribution among key industrial and government executives. The booklet, "Gray Iron—Facts About The Gray Iron Industry," describes the place of the industry among other metalworking units and its contribution to the war effort in World War II, telling how this second largest industry in the metalworking field has proved vital in peace and essential in war. *Gray Iron Founders Society, Inc.*

For free copy insert No. 2 on postcard.

All About Roofing

A new publication, "Terne Topics," is published primarily for sheet metal contractors in the interests of terne metal roofing. Vol. 1, No. 1 of the 8-p. paper contains an editorial by R. K. Follansbee entitled, "Let's Call It Terne," in

which he asks for an end to the practice of referring to the firm's product as "tin roofing." Terne, he points out, is an alloy consisting of approx 20 pct tin and 80 pct lead. Part of the publication pictures well-known homes and buildings using terne roofing around 1900, telling that some of the roofs shown were old even then. *Follansbee Steel Corp.* Address requests to this column on company letterhead.

Special Tool Steels

An extensive series of special alloy tool steels are described in a new 28-p. booklet describing 13 steels and illustrating examples of tools and dies made from each. The booklet gives complete details on the steels made by this British company, and explains suggested heat treatments for producing optimum properties. Various users' reports are included, and color codes are listed. *Edgar Allen & Co., Ltd.*

For free copy insert No. 3 on postcard.

Solvents Handbook

Written specifically for non-technical personnel, a new 64-p. handbook on organic solvents gives hundreds of definitions, comparison tables, testing methods, and product descriptions on a wide variety of solvents in common use. Data are given on flash-point, toxicity, dry time and solvent power. This pocket-size booklet is of special value to buyers and other personnel who are not technically trained, since it explains in lay language the properties of products and the application of such properties. *Central Solvents & Chemicals Co.*

For free copy insert No. 4 on postcard.

Defense Production Info

A new and comprehensive 8-p. bulletin on heating and heat treating equipment for defense production covers heating for forging as well as heat treatments to develop the required properties for all kinds of ordnance material. Among the items covered in the bulletin are ammunition, guns, tanks, aircraft and ships. The production of engines, power transmission equipment, as well as tools and special parts, is also covered. *Surface Combustion Corp.*

For free copy insert No. 5 on postcard.

Safe Coal Storage

An 8-p. educational booklet entitled "Economic Coal Storage" is suited as a training aid on safe, orderly coal handling methods. The booklet describes use of the most flexible type of equipment, with low operating cost, obtained by a small investment, which teaches how to store coal without the hazards of fire and oxidation. *Tractor Div., Allis-Chalmers Mfg. Co.*

For free copy insert No. 6 on postcard.

New Brushing Catalog

A new 76-p. brushing catalog, designed to simplify selection of the best brush for the individual job, contains numerous illustrations of industrial brushing operations, along with photos and descriptions of a complete line of power, paint, varnish and maintenance brushes. The booklet includes a 3-p. digest of the origin of Osborn brush materials from many parts of the world, a section on se-

Turn to Page 140

Oil Fog

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Oil Fog Lubricator

Gives uniform distribution of oil fog, with precision flow control.

A new Micro-Fog Lubricator creates a true fog that remains in suspension longer, may be carried distances many times greater than heretofore, it is reported, and provides more uniform distribution of oil fog to many outlets. Less air flow is required and possibility of oil flooding the lines and tools is minimized. Precision flow control is provided down to as little as one drop of oil in 20 min, if desired. Reclassification of the fine oil particles at the point of application makes the fog wettable to almost any desired degree. The lubricator is completely automatic. C. A. Norgren Co.

For more data insert No. 18 on postcard.

Countersink

For pneumatic countersinking in all types of sheet metal.

Utilizing a standard bayonet type countersink, the tool has a built-in lubricator and can be operated by anyone without special training. It countersinks in all types of sheet metal, including 27 St and 75 St aluminum and alloy steels. Mandrels for varying hole diameters and countersinks can be changed rapidly, without dismantling the tools. A built-in micrometer gives accurate adjustment. Manufactured in six sizes, the Cleco Airmatic countersink capacity ranges from 5/16 to 5/8 in. hole diameters, with metal thickness to 1 1/4 in. Smaller sizes weigh 18 lb; larger sizes 19 lb. Cleco Div., Reed Roller Bit Co.

For more data insert No. 19 on postcard.

Exhaust Fan

For handling sulfuric acid fumes; reportedly gives longer fan life.

The fan is used in chemical plants and steel mill or metal working shops where sulfuric acid is used for processes such as pickling. It is constructed of Carpenter Stainless No. 20 and is capable of withstanding sulfuric acid attack at temperatures up to 176°F. International Engineering, Inc.

For more data insert No. 20 on postcard.

Induction Brazing Machine

Provides quick setup for brazing, heat treating moderate size parts.

The machine has a heavy steel table with an adjustable press type fixture. It bolts directly to the front of Sieco standard induction heaters. The machine uses a modified drill press head in which the mechanism is reversed so that its spring load holds the workpiece down against an anvil. The chuck is used to secure and center a vari-

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production ideas

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ety of simple workholding fixtures. It is not necessary to rotate the workpiece. Operating controls are at the top of the machine. A load meter reads directly the percentage of full load. Output frequency is in the megacycle range, and both steel and brass work can be handled. Machines operate on 220 v, 60 cycle, single phase supply lines. *Sherman Industrial Electronics Co.*

For more data insert No. 21 on postcard.

Hard Facing Rod

Oxyacetylene welding rod for medium impact and high abrasion.

Known as Wear-Flame 40, a new welding rod is a centrifugally cast hard facing rod consisting of highly wear-resistant chromium carbides contained in a hard iron chromium, manganese alloy matrix. Overlays offer a high resistance to wear on parts subjected to medium impact and compression. Hardness

is retained at relatively high temperatures. Hardness of deposited metal is Rc56-58. Sizes are $\frac{1}{8}$ in. diam x random lengths; 5/32 to $\frac{3}{8}$ in. diam x 14 in. long. *Alloy Rods Co.*

For more data insert No. 22 on postcard.

Oil Burner Safeguard

Combustion safeguard system cuts off fuel in case of failure.

A new electronic combustion safeguard system for commercial oil burners is said to assure positive protection against combustion failure; if the gas pilot does not ignite, the supply of fuel is cut off. After the cutoff, the motor continues to operate for 30 sec to purge the nozzle or cup of unburned fuel to prevent carbonizing and reduce field servicing. The system is then locked against further operation until manually reset. The co-ordinated equipment includes a switch-amplifier-contactor unit, phototube holder, and electrode holder. *General Electric Co.*

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Dual-Purpose Hand Truck

Features built-in hydraulic hoist for lifting and stacking.

A combination hand truck and stacker can be used for loading and unloading heavy cases and barrels from ground level where loading docks are not available. It enables one man to load and stack heavy merchandise, after transporting from one location to another. This Lift Stacker weighs 111 lb; has 500 lb capacity, and will lift loads to tail-gate height of 54 in. The platform is 22 x 19 in. *Clark-Hopkins Equipment Corp.*

For more data insert No. 24 on postcard.

Flow Control Valve

Maintains constant flow over a wide differential pressure range.

Having innumerable applications in hydraulic circuits and systems, a versatile, 1500 psi, compensated type flow control valve maintains constant flow regardless of variation in inlet and outlet pressure. It is adjustable from completely shut off position to 25 gpm maximum flow, with control lever rotation (270°) permitting accurate flow settings. Eight model variations are available for $\frac{3}{8}$ and $\frac{1}{2}$ in. pipe sizes. *Adel Div., General Metals Corp.*

For more data insert No. 25 on postcard.

Lens Tissue

Silicone-treated tissue for cleaning goggles and glasses.

Development of a superior silicone-treated tissue for cleaning goggles and glasses in factories, mills and offices has been announced. Sheets are interfolded for handling in a simple dispenser. They are trade-marked Magic Lens Tissue. *Silicone Paper Co. of America, Inc.*

For more data insert No. 26 on postcard.

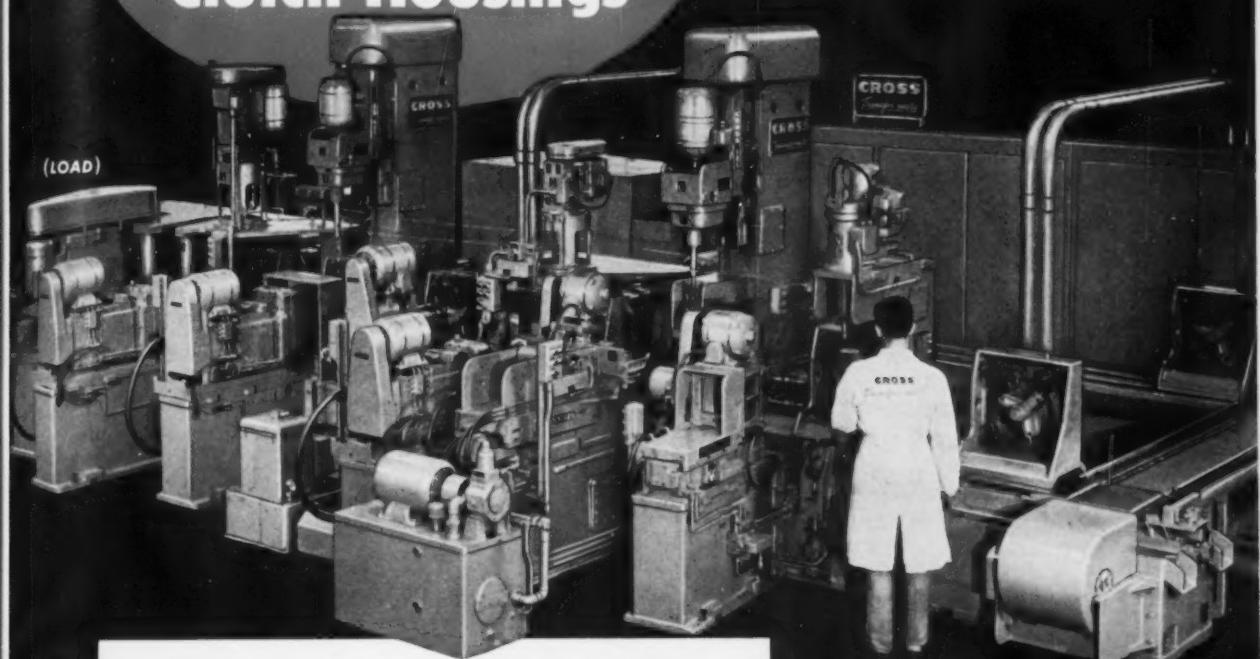
Magnetic Conveyer Element

Available in 3 styles for conveying skelp, plate, sheet, rod, bar, pipe.

Many advantages are said to accrue to the user of an Alnico magnetic conveyer element: Because a standard iron pipe length or other standard section can be used as the revolving induced magnetic unit, the conveyer elements are simple to repair, resurface or replace. A maximum amount of conveyed magnetic material is subjected to the direct action of the magnetic field,

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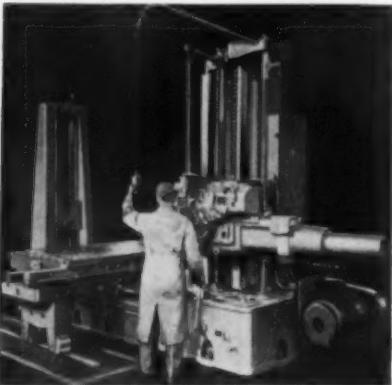
inasmuch as the major magnetic field is at right angles to the material movement and extends for the full width of the conveyor. The magnetic force is not limited by the diameter of the magnetic rotating member since the magnetic element is a separate unit and can be varied in size and strength as required. The magnetic strength of the unit can be adjusted by changing the air gap between the plate magnet and revolving members suspended above. *Eriez Co.*

For more data insert No. 27 on postcard, p. 35.

Single-Spindle Machine

Has maximum machining efficiency when using carbide cutting tools.

Speeds from 10 to 1300 rpm in fine increment through 45 changes provide the new single-spindle, high speed horizontal boring, drilling and milling machine with specific metal working advantages. Closer speed selection permits high machining efficiency when using carbide and cast alloy tipped cutting tools. Where carbides are not required the machine has capacity and adaptability for light, medium and heavy duty machining. The



machine is designed to meet production requirements that demand continually faster cutting speeds, heavier cuts, better finishes and greater accuracy—with overall economy in operation. New structural features have been added to the basic G&L machine. Heavy duty, hardened bed and saddle ways maintain high machining accuracy over longer periods of time; a 4-in. diam nitralloy steel spindle having 30-in. travel and rotating on anti-

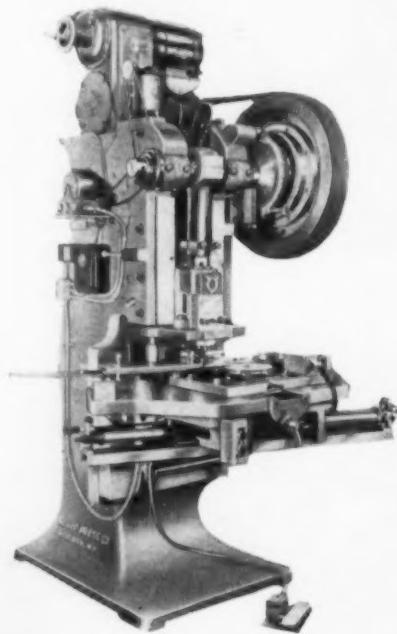
friction bearings, provides speeds to 1300 rpm; positive, automatic machine settings to close limits are possible with a quick-acting electrically-operated positioning device; and electric pushbutton control station has forward-reverse-stop-and-inch buttons. *Giddings & Lewis Machine Tool Co.*

For more data insert No. 28 on postcard, p. 35.

Segmental Notching Press

Notches motor segment laminations; needs no index ring, spacing is in die.

A segmental notching press is used for the notching of rotor or stator segments of the larger sizes



that cannot be handled on the conventional index ring type fixture. Capacity is from 24 in. diam segments up to a straight line. The segment blank is placed in position on the fixture and by a foot switch is automatically moved into notching position against a stop, which immediately starts the press and performs the prescribed notching operation. At the end of the cycle, a micro switch action stops the press and returns the notched segment to its original position for removal. *V & O Press Co.*

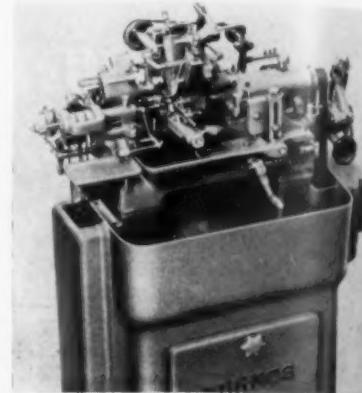
For more data insert No. 29 on postcard, p. 35.

Automatic Screw Machine

Produces very small precision screws used in instruments.

Identified as the Tornos Automatic Type TV, the new machine works on the same principle as

other Tornos models with the sliding headstock. A combination of four radial tools for the turning, forming or cutting-off operations, a sensitive threading spindle and a



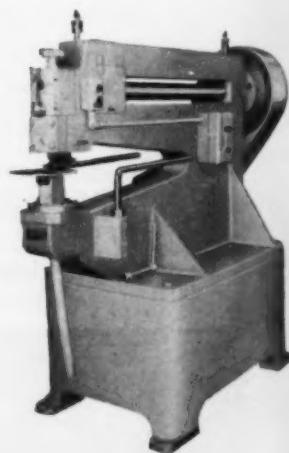
slotting attachment of new design enables the production of high precision screws with maximum output. By means of multiple cams, screws of different sizes can be produced without changing the tooling and without loss of production time. A headstock spindle stopping device, consisting of a friction clutch, is controlled by adjustable cams, and can be set at any time during the cycle of the camshaft. *Carl Hirschmann Co.*

For more data insert No. 30 on postcard, p. 35.

Nibbling Machines

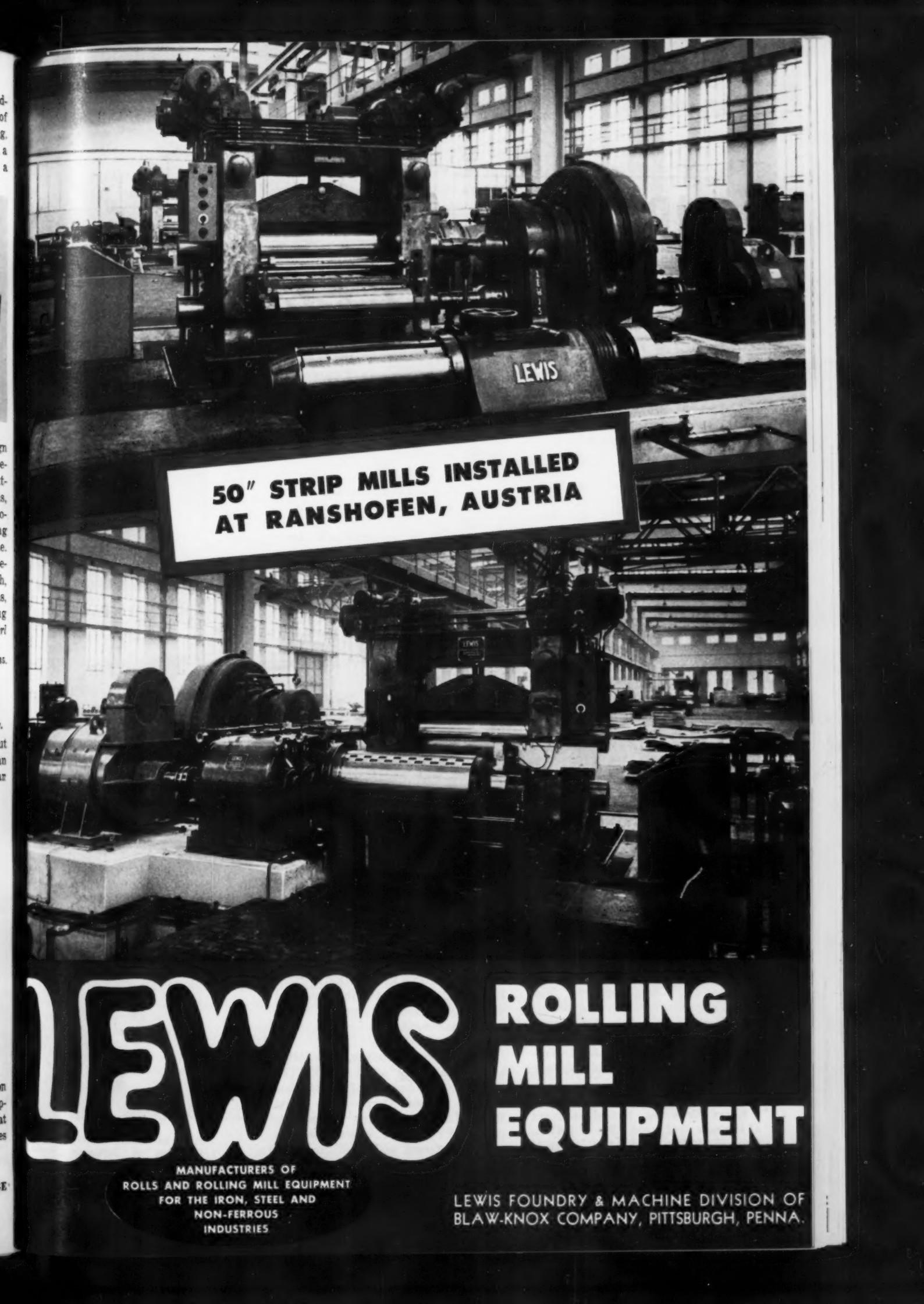
Cut odd shapes of ferrous and nonferrous metals quickly, cleanly.

Campbell nibblers are said to cut from 40 to 60 times faster than drilling and filing. The work car



be fed equally well in any direction because the work is cut with a rapidly moving circular punch that operates over a circular die. Pieces

Turn to Page 146



**50" STRIP MILLS INSTALLED
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IRON AGE

introduces

Graham B. Brown, appointed administrative assistant by TUBE REDUCING CORP., Wallington, N. J.

Frank U. Naughton, Jr., named manager of the Eastern sales division, Hyatt Bearings Div. of GENERAL MOTORS CORP., Harrison, N. J.

Howard K. Suter, named plant manager of ROSAN, INC., South Gate, Calif. Mr. Suter will be in full charge of manufacturing facilities and will be responsible for developing new methods and expediting the business of the company.

C. B. Foster, heads a new department of the sales division as manager-contract sales and John W. Post was named regional manager of the Washington, D. C., region for CUMMINS ENGINE CO., INC.

Joseph W. Fiske, elected director and assistant treasurer of the J. W. FISKE IRON WORKS, New York.

Robert D. Scott, Jr., appointed general manager-production for all plants of the B. F. GOODRICH CHEMICAL CO., Cleveland. John L. Nelson succeeds Mr. Scott as plant manager at Louisville.

R. A. Metcalf, appointed assistant sales manager of the MILLER ELECTRIC MFG. CO., Appleton, Wis. Other appointments: W. H. Siefferman, Northwestern district manager; F. H. Beck is now taking over the state of Michigan; and J. E. Vosburgh has been appointed Western district manager.

Harry Brownlee, named manager of the new Gulf coast office of PAULSEN-WEBBER CORDAGE CORP., New Orleans.

W. E. Bannerman, appointed vice-president of PAGE-HERSEY TUBES, LTD., Toronto, and C. S. Webber appointed as assistant to the president.

A. F. Garcia, named manager of the Tacoma aluminum reduction works of KAISER ALUMINUM & CHEMICAL CORP., to succeed C. P. Love who will head the corporation's new aluminum reduction plant at New Orleans.

Norman W. Calkins, named manager of tool steel sales and Harold A. Grossman, manager of alloy steel sales by the CARPENTER STEEL CO., Reading, Pa.

Frederick L. Rowe, appointed district sales manager by the AMERICAN CHAIN & CABLE CO., INC., for the American Chain and Manley divisions, with headquarters at San Francisco.

Charles M. Hollis, elected a vice-president of KAISER-FRAZER CORP., Willow Run, Mich. Mr. Hollis is comptroller of the corporation, with R. J. Jaspersen appointed his assistant.

W. H. Dickinson, appointed director, engineering department, headquarters manufacturing division of WESTINGHOUSE ELECTRIC CORP., Pittsburgh. G. P. Longabaugh, appointed director of the headquarters equipment department.

Arthur P. Cortelyou, appointed general manager of U. S. VANADIUM CO., a division of Union Carbide & Carbon Corp., New York. R. M. Mahoney, formerly of the company's Pine Creek operations, has been transferred to New York.

Turn to Page 52



A. MACFADYEN, elected president and general manager of Page-Hersey Tubes, Ltd., Toronto.



JAMES F. BISHOP, elected to the board of directors of the American Hoist & Derrick Co., St. Paul.



P. G. MATTERN, elected assistant secretary of Bethlehem Pacific Steel Corp., San Francisco.

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NOT JUST A

March

Straight story about TIMKEN® bearings

THE new Taylor Wilson rotary straightener shown below can handle heavy wall alloy tubing up to 9 $\frac{1}{2}$ " diameter. Tubing is straightened by a total of eight rolls—four driven rolls, one entry roll, two idling rolls and one delivery roll. All are mounted on Timken® tapered roller bearings for friction-free trouble-free operation.

Timken bearings are also used in the main drive and the auxiliary drive. Due to the line contact between the rollers and races, Timken tapered roller bearings have extra

load-carrying capacity. Their tapered construction permits them to take radial as well as thrust loads in any combination. Deflection and end-movement are minimized, wear on moving parts reduced.

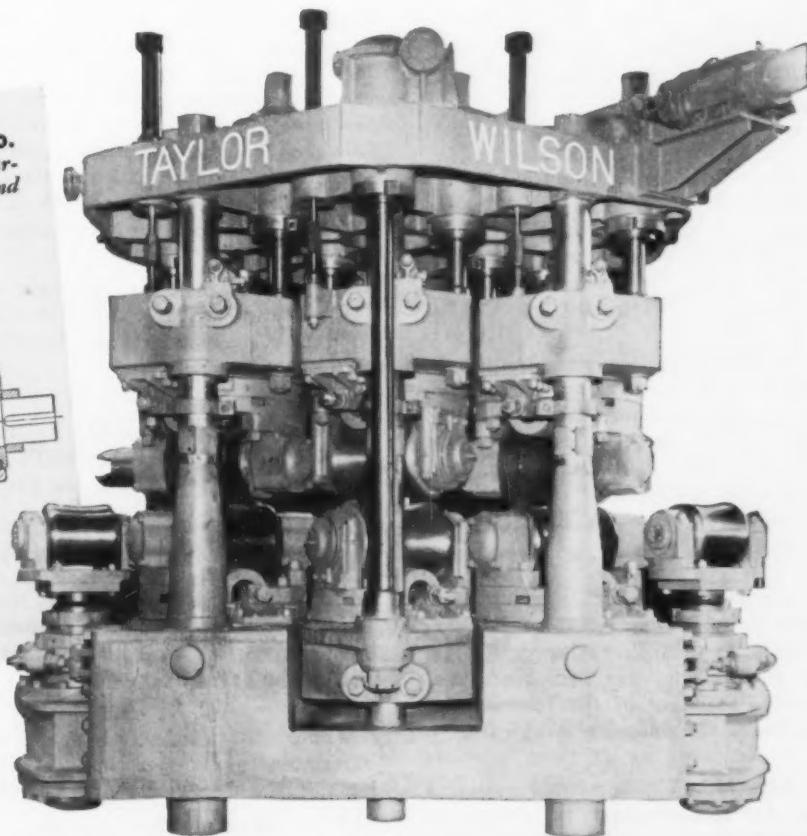
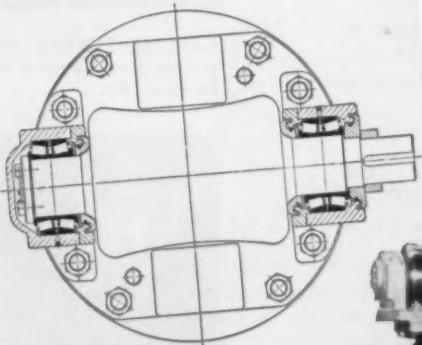
Timken bearings are manufactured to extreme limits of precision and finished to incredible smoothness, resulting in practically friction-free operation. Under normal usage they last the life of the machine because they are (1) engineered for the job, (2) made of Timken fine alloy steel and (3) precision manufactured.

The dependable performance of Timken bearings has made products equipped with Timken bearings first choice throughout industry. When you specify bearings, specify Timken bearings. And when you buy new equipment, make sure it has the advantages that only Timken bearings can give it. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.

How TAYLOR WILSON MANUFACTURING CO. mounts straightener rolls on Timken bearings for dependable, low-cost service and long life.



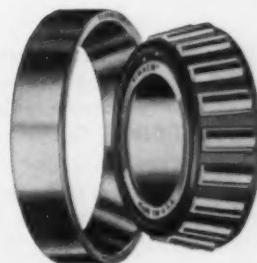
IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ○ THE TIMKEN TAPERED ROLLER ○ BEARING TAKES RADIAL ○ AND THRUST ○ LOADS OR ANY COMBINATION ○

IRON AGE

introduces

L. S. Chadwick, retired as president and chairman of the board of PERFECTION STOVE CO., Cleveland. Mr. Chadwick joined the organization as a consulting engineer in 1912, when it was known as the Cleveland Foundry Co., and became president in 1922.

Dale D. Spoor, granted a leave of absence as manager of the equipment sales department of AIR REDUCTION SALES CO., New York, to serve with the National Production Authority in Washington, D. C.

Ray F. Ellis, appointed assistant director of sales; **Augustus Vogel**, general sales manager, Industrial Div.; **H. Waddle**, general sales manager of the Mill Div.; **A. L. Martinson**, general sales manager of the Hardware Div., of the E. C. ATKINS & CO., Indianapolis.

Gustav Schwab, Jr., appointed assistant purchasing agent of DRAVO CORP., Pittsburgh, replacing **William R. Havlak** who was named administrative manager of the contract department, Engineering Works Div.

John Mikulak, appointed assistant to the vice-president in charge of manufacturing of WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J.

Roy Paulsen, named general manager of A. C. Woods & Co., Rockford, Ill., wholly-owned subsidiary of KROPP FORGE CO.

James Edward Gallagher, appointed Eastern division sales manager of CORY CORP., Chicago. Mr. Gallagher will supervise the 14 state Eastern division territory of the company, which is divided into five sales territories.

Rudolph Smith, named works manager of the Pueblo plant of the COLORADO FUEL & IRON CORP., filling the position which has been vacant since 1949. **George Grosvenor**, Mr. Smith's former assistant, has been promoted to superintendent of the openhearth department. **Iver T. Ellingboe** becomes assistant superintendent of the openhearth and **Harold Gumma** was promoted to assistant superintendent of the rolling mills.

T. M. Evans, elected to the board of directors of the WHITE MOTOR CO., Cleveland. Mr. Evans is president of H. K. Porter Co., Inc.

James M. Rowe, elected to the board of directors of LAMSON & SESSIONS CO., Cleveland. He fills a board vacancy.

R. L. McCann, elected president of the NEW JERSEY ZINC CO., New York. Mr. McCann succeeds **Henry Hardenbergh**, who was elected chairman of the board of directors.

Wilbur B. McLaren, appointed superintendent of personnel at the Indiana Harbor Works of INLAND STEEL CO., Chicago.

O. J. Stoudt, promoted to sales manager, southern division of BRUMLEY-DONALDSON CO., Los Angeles.

Glen T. Johnson, named general manager of the San Leandro, Calif. plant of the DODGE BROS. CORP.

William B. Keirn, appointed superintendent of a cold rolling mill and tin plate mill now being built at the Fontana Works of the KAISER STEEL CORP., Fontana, Calif.

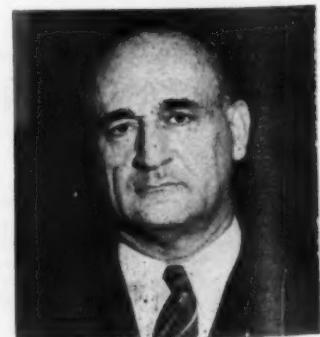
Turn to Page 88



CARL M. RIEFFKIN, elected vice-president of Newport Steel Corp., Newport, Ky.



CYRIL GRINDROD, elected a vice-president of the Dole Valve Co., Chicago.



JACOB LEVINSON, named director of purchases for The Levinson Steel Co., Pittsburgh.

IRON AGE

salutes

Albert J. Berdis



THE man who will operate U. S. Steel's huge new Fairless Works was one of those kids who had two strikes against him but who managed to belt the pay-off pitch out of the park. It wasn't a fat pitch either.

Much of his early life was a struggle with finances; he had to quit Purdue for 2 years to earn enough money to go back. He earned it working in the Gary Sheet and Tin Mill.

Looking back, his big break came when he was one of five promising freshmen taken in tow by a U. S. Steel Corp. "talent scout" looking for potential executive timber. That didn't solve his problems by any means, but it did improve his aim.

After college he went to work in Pittsburgh as chief design engineer for U. S. Steel's Irvin Works. Later he served as chief engineer and in 1945 became assistant to the general superintendent. When the corporation decided to build the Eastern mill he worked on the layout and design of the plant he will operate.

Al Berdis is one of those rare persons who takes the time to do the things that many people claim they are too busy to do. It's just his nature—he's surprised to find how well it pays.

His hobby is one of the greatest and most interesting in the world—people. He likes people, likes to be with them and help them when he can. One reason is his deep sense of gratitude for what others have done to help him. Also, he finds that in helping others he invariably helps himself.

Al has come to the top fast. He's still a young man (41) by any standard, and especially so for the big job facing him. But people who know him aren't fooled by the boyish look. They have confidence he'll keep right on being a winning player.



JOHN E. CARROLL, elected to the office of vice-president of sales of the American Hoist & Derrick Co., St. Paul.



R. S. GRUBER, appointed temporarily, special assistant to the president of Armco Steel Corp., Middletown, Ohio.



FREDERICK J. GRIFFITHS, elected a member of the board of directors of Follansbee Steel Corp., Pittsburgh.



LAWRENCE V. NAGLE, elected a director of the UDYLITE CORP., Detroit. Mr. Nagle is vice-president and national sales manager of the company.

IRON AGE introduces

Continued

Donald F. Kittredge, appointed manager of sales, railway division, New York, by NATIONAL MALLEABLE & STEEL CASTINGS CO.

Gilbert F. Stenger, named fleet sales manager of the truck tire sales department of the B. F. GOODRICH CO., Akron, Ohio. Mr. Stenger succeeds **Howard F. Kidwell**, transferred to Detroit, in the company's automotive, aviation and government division.

Herbert E. Smith, elected a director and a member of the finance committee of the U. S. STEEL CORP., New York.

William A. Burns, Jr., and **J. B. Wharton, Jr.**, elected members of the board of directors of the TRAILMOBILE CO., Cincinnati.

Paul A. Wick, appointed assistant to the president of the ROCKWELL MFG. CO., Pittsburgh.

Gerald E. Smart, named assistant plant engineer at the Norwood, Ohio Works, of ALLIS-CHALMERS MFG. CO. **Dwight H. Lory**, appointed to the electrical sales and engineering department at the Norwood Works.

R. L. Prain, elected a director of the INTERNATIONAL NICKEL CO. OF CANADA, LTD. Mr. Prain is chairman and managing director of Rhodesian Selection Trust, Ltd., Mulfulira Copper Mines, Ltd., and Roan Antelope Copper Mines, Ltd.

Wyman L. Wills, named in charge of extruded solder sales at the Whiting, Ind. plant of FEDERATED METALS DIV., American Smelting & Refining Co.

E. C. Delano, appointed manager of the New England district of the WESTINGHOUSE ELECTRIC CORP., Boston. Mr. Delano started with the company 30 years ago.

Robert R. Person, appointed staff assistant to the manager of manufacturing, Large Apparatus Div., of GENERAL ELECTRIC CO., Schenectady.

Walter H. Roesing, appointed district sales manager of certain areas of New York, New Jersey and Connecticut, for DeWALT INC., Lancaster, Pa.

Lloyd R. Loewen, elected treasurer and assistant secretary of the MIDVALE CO., Philadelphia.

Leslie M. Cassidy, elected chairman of the board and chief executive officer of JOHNS-MANVILLE CORP., New York and **Adrian R. Fisher** was appointed president.

Horace H. Hopkins, appointed an assistant to the treasurer of E. I. DU PONT DE NEMOURS & CO., Wilmington, Del. Named to succeed Mr. Hopkins as assistant general manager of the fabrics and finishes department is **David H. Dawson**, now assistant general manager of the pigments department. **Joseph Shrawder, Jr.**, succeeds Mr. Dawson.

C. H. Morse, Jr., appointed manager, locomotive service department, Railroad Div. of FAIRBANKS, MORSE & CO., Chicago.

G. O. Griffin, named insurance manager for DRAVO CORP., Pittsburgh. **Robert Hughes** has been appointed executive assistant to the general manager of the Engineering Works Division.

OBITUARIES

Harry W. Schuetz, 66, vice-president of Pittsburgh Screw & Bolt Corp., died recently. Mr. Schuetz was associated with the company since 1928.

C. D. Barr, Jr., 38, associated with the American Cast Iron Pipe Co., died recently after a long illness.

Phillip J. David, 75, a toolmaker at the Singer Mfg. Co., Elizabeth, N. J., for over forty years, died March 6, 1951.

Lewis H. Brown, chief executive officer of the Johns-Manville Corp., New York, died recently.

Stuart A. Dussalt, president and general manager of the Dussalt Foundry Corp., Lockport, N. Y., died March 6, 1951.

John B. Thomas, 77, for the past 25 years a roller for the Weirton Steel Corp., Weirton, Pa., died recently.

Ernest Murphy, 67, former president of the Pressed Steel Car Co., died recently at Norwalk, Conn.

Victor R. Browning, president of the Victor R. Browning & Co., Inc., Willoughby, Ohio, died recently.

MESTA Forgings

Mesta has facilities for the production—from raw material to finished product—of forgings in all sizes required by industry. Shown is a gigantic generator shaft, forged in a 6000-ton Mesta Press, and finished in the Mesta Shops.

Write for descriptive forging literature.

**DESIGNERS AND BUILDERS OF
COMPLETE STEEL PLANTS**

MESTA MACHINE CO.

PITTSBURGH, PA.



on the assembly line

*automotive
news and
opinions*

**Republic Steel metallurgist sees
metal, ore shortages . . . SAE group
holds 3-day session in Detroit.**



by Walter G. Patton

Look Into Future—The auto industry took a look into the future during the recent 3-day session of the SAE National Passenger car, body and materials group at Detroit. The program was well balanced, including outstanding papers on the new Chrysler engine, recent developments in dynamometers and instrumentation, passenger car safety and riding comfort.

Of special interest were papers on strategic materials, requirements of military motorized equipment and some recent tire studies by U. S. Rubber researchers.

Ore Transportation—E. C. Smith, chief metallurgist, Republic Steel Corp., took a critical look at the critical metals picture, including iron ore, coal and the several alloying elements.

He said there are no existing facilities to transport ore for 110 million net tons of steel ingots, despite movements by rail of more than 2 million tons of ore last year. No relief is in sight from foreign ores during 1951. Both Labrador and Venezuelan ores are some years away. Venezuelan ores may not cross the million mark for another 2 years.

Scrap Is "Disturbing"—Scrap will be a disturbing factor in 1951, Smith said. War production invariably interrupts the scrap cycle

and will have far-reaching consequences. An example: the ingot for a tank gun may be cast a year ahead of final inspection and acceptance or scrapping of the gun.

The scrap lag, Smith emphasized, is about three times as long as in peacetime. Inadequate power will also limit electric furnace steel output, Smith asserted.

Warning on Alloys—Smith's most serious warning concerned alloy steel. In 1945, he said, the jet engine program contemplated by Washington would have required substantially all the available nickel and low-carbon ferrochromium. About half of the available molybdenum would also have been used by this program.

In addition, the required amount of columbium, cobalt and tungsten exceeded the visible supply. Combat ended before this program got under way, Smith pointed out, so there has been no past experience with this critical alloy problem.

Manganese on the Wing—To illustrate further the grave ramifications of the alloy problem, Smith pointed out (1) in case of an all-out war, it may be necessary to fly manganese ore to this country from Africa, (2) U. S. consumes about 75 pct of the world's chromite but produces almost none, (3) columbium, a stab-

ilizer used in stainless steel, may be the most serious of all the alloy problems, (4) The U. S. lost a golden opportunity to stockpile nickel during 1949 when domestic consumption dropped 31 million lb compared with the previous year's demand.

Production Ratio—Another unfavorable trend is the relation of man-hours to production. The big auto firms, Smith says, turn out about 3 lb of car for 1 hr of wages. During World War II the ratio was 1 lb of tank produced per hr of wages. Under today's conditions, Smith does not look for more than $\frac{1}{2}$ lb of tank output per hr of wages, adding further to the critical manpower problem. But the U. S. may not have enough manpower or the will to work long enough to consume the material available, he suggested.

Copper Stocks Drop—Earl Smith's warning about steel and alloys was amplified by Richard J. Lund, supervisor of the Engineering Economics Div., Battelle Memorial Institute.

Copper stocks were drawn on heavily during 1950, Lund reported, dropping about 133,000 tons. Producers' stocks were down to 2 weeks' supply at year's end. The 1951 outlook is for a 10 pct increase in domestic production. Both scrap intake by producers

assembly line

Continued

and imports may be less than in 1950, he pointed out.

Aluminum Capacity—Domestic aluminum production may reach 1,200,000 tons in 1951, Lund believes, but stockpiling may take 150,000 to 300,000 tons, depending somewhat on the momentum of the aircraft program. By 1953 capacity should be well ahead of the World War II peak of 1,132,000 tons.

There's serious talk of boosting primary capacity to 1,700,000 tons. Canada also has ambitious expansion plans, so aluminum output in North America may double in the next 3 to 5 years.

Power Bottleneck?—Magnesium consumption increased 50 pct during 1950 to 27,000 tons. With the reactivation of six government plants, primary magnesium output may be boosted to 122,000 tons—about five times the present output but far short of 184,000 tons made available in 1948.

Power is the potential bottleneck here. By 1952 the Dow continuous rolling mill near St. Louis should be able to roll 3 million lb of sheet monthly, as compared with the total present rolling capacity of approximately 400,000 lb per month.

Tin Supply Inadequate—Lund sees trouble ahead with cadmium and cobalt. While available tin is being spread a lot thinner on cans these days, and tin content of can solders has been cut from 40 pct to 8 pct, world consumption has been in excess of production for several years.

Nonferrous Not Encouraging—The broad conclusion reached by the Battelle engineering economist is that, except for aluminum and magnesium, the outlook for nonferrous metals is not encouraging. The U. S. would undoubtedly be in much better shape today so far as domestic output of critical and strategic materials is concerned, he continued, if the

"fiscal climate" of the past decade had been more conducive to taking long term risks in the long-shot game of mineral exploration and development.

Must Fit Doors, Ramps—A new dimensional requirement has placed further limits on equipment designed for the military. Height and width of many wheeled vehicles are limited by the door size of planes or the ramp opening of the landing barge. Accessories like spotlights and ventilators may not increase overall dimensions. The length of an ambulance is fixed by the length of the standard Army litter. These are all new problems for engineers working on military vehicle body requirements.

As pointed out by Capt. J. L. Quinnelly, U. S. Army Ordnance Corps, Detroit Arsenal, vehicle bodies are being designed so a switch from wood to steel construction will be possible if steel is unobtainable. Another limitation is severe climate requirements.

More New Needs—Other new requirements include: (1) deep

water fording, requiring provisions for air intake and exhaust, (2) winterization, (3) insulated floors and personal heaters for arctic enclosures, (4) ground mine protection to prevent injury to personnel by land mines, (5) armored cabs to replace the standard cabs.

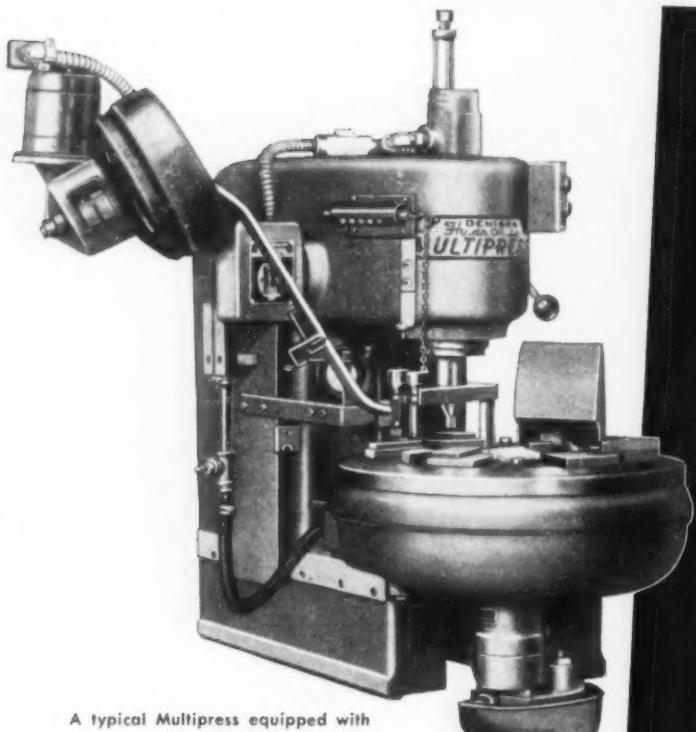
Wider Cars for Caution—H. L. Gandelot, of General Motors Corp., has indicated wider automobile bodies have the favorable psychological effect of inducing drivers to allow more room for passing. He argued that the overhang of longer bodies has the effect, in collisions, of functioning as a shock-absorber. Front-end metal crumples and crushes, absorbing much of the impact.

Titanium for Defense—What the commercial development of titanium and its alloys may mean in the defense effort was suggested by Col. B. S. Mesick, Chief, Research and Materials Branch, Ordnance Dept., who pointed out that successful substitution of titanium alloys for steel armor could reduce weight about 40 pct.

THE BULL OF THE WOODS

By J. R. Williams





A typical Multipress equipped with a six-station indexing table, special tooling and hopper feed, used to rivet electrical contacts on brass and spring steel contact arms.

MULTIPRESS®

is the answer to

FASTER BETTER SAFER PRODUCTION

for hundreds
of operations

With Accurate Pressure Control Plus Wide-Range Adjustability, Multipress Offers Unique Production Advantages

SMOOTH, ACCURATE, OIL-HYDRAULIC ACTION, specially engineered for production speed and efficiency, plus quick, easy, wide-range adjustability! That's what enables Multipress to make cost-cutting news on so many different types of jobs!

More than six-thousand Multipresses now offer working proof of this ability to speed production, improve quality, reduce rejects and scrap losses, increase safety, cut worker fatigue, reduce die wear, and slash costs.

A quick review of a few Multipress features will show why!

Pressure is infinitely adjustable, within the full pressure range of the press.

Pressing and approach speeds can be adjusted separately, to combine rapid traverse with controlled working speeds.

Ram stroke can be preset for either distance or pressure limits.

Controls for time delay, or ram dwell, and many sequence requirements are available.

Exclusive Multipress Vibratory Ram Action—ram effort applied in a series of short, rapid, full-tonnage strokes in each cycle—is also available.

Multipress can be equipped for either manual or automatic ram control, with dual levers or push buttons for extra safety.

Highly compact Multipress design requires minimum floor space and head room... gives maximum advantage in locating parts bins, tote boxes, hopper feeds, conveyor equipment, and other accessories.

Indexing tables and dial feed tables for feeding parts to the press ram automatically, are standard Multipress accessories. Others include harmonic stock feed, straightening fixtures, pelleting equipment, and a foil marking attachment.

• • • • •
Multipress is tailored to individual production needs, in eight different frame sizes, with capacities from 1 ton up to the 50-ton range. For more information, write The Denison Engineering Company, 1158 Dublin Road, Columbus 16, Ohio.

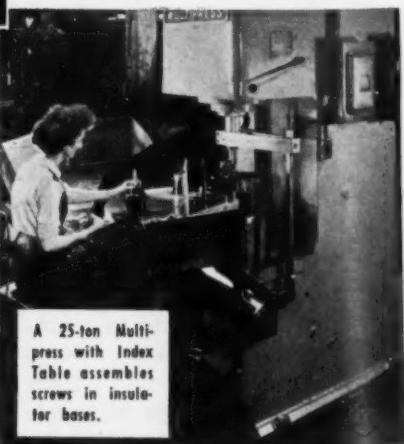
DENISON
HydroOILics



8-ton Multipress used by famous radio maker in producing speaker assemblies.



A 4-ton Multipress with Index Table broaches serrations on small cams.



A 25-ton Multipress with Index Table assembles screws in insulator bases.

west coast progress report

*digest of
far west
industrial
activity*

by R.T.Reinhardt



About Face on Power — Although a year ago Bonneville Power Administration officials painted a black picture of available power for industries in the Pacific Northwest, they now contemplate supplying 300,000 kw of power to some new aluminum reduction plants. Alcoa would like a plant near Wenatchee or possibly Grand Coulee, and Eastern Metal Products Co. has been surveying sites in Washington.

Alcoa would need 120,000 kw of firm power and 60,000 kw of interruptible power and Eastern Metals would need about 120,000 kw of firm and interruptible power combined. Alcoa would probably be supplied by additions to facilities at Rock Island Dam and Eastern by sources other than the BPA—possibly steam generation plants.

Speed BPA Projects? — Additional loads may require speed-up of several BPA projects now under construction or proposed. Assuming normal or average precipitation, power supply will be critical until 1955. A power tie-in between Oregon and California is expected to be completed in late 1952 and will add 100,000 kw to the Bonneville grid.

Troy Manufacturing Co., made up of a group of small eastern aluminum fabricators, still hopes it too can establish an aluminum reduction plant near Bellingham, Wash., which probably would be

supplied with electricity generated in a steam plant.

Good News for Seattle — Announcement that a production contract was being given Boeing Airplane Co. at Seattle to produce the B-52, a heavy jet bomber, has given a lift to the entire city.

The Seattle plant of Boeing lost the production on the B-47 to the inland plant at Wichita, Kansas, and there was some uncertainty as to future contracts in the Northwest plant. The B-52 is similar to the B-47, but much larger. While never flown, the B-52 is expected to have a speed in excess of 500 mph, combat altitude above 55,000 ft and a range of 10,000 miles.

Signs of the Times — Major metal sash and door plants in Seattle will have to close by June 30 unless they are allocated metal or receive defense contracts it was reported in a meeting of representatives of labor, industry, and metal manufacturing firms last week.

NPB's curtailment on use of aluminum and steel in such products is responsible for the anticipated shut-downs which will directly affect approximately 300 employees in five major firms.

Will Close Warehouse — Another result of the steel shortage is the abandonment by Bethlehem Pacific Coast Steel Corp. of its mill warehouse in San Francisco. This struc-

ture which has four acres under roof was built in 1946 but there has been but little opportunity to use it for its original purpose.

Most of the sprawling building is devoted to the warehousing of food stuffs, tin cans and miscellaneous commodities under lease. Fully equipped with heavy duty cranes and served by two spur tracks, the structure is now up for sale.

Defense Pool Formed — Pacific Defense Industries has been organized to pool resources of plants in California, Oregon and Washington to facilitate procurement and handling of war defense contracts.

The organization states that it will assume full responsibility for the completion of contracts, allocate work to plants best equipped to perform various portions of the work and will handle sale and contract negotiations with the government and other prime contractors.

Scrap Situation Bad — Scrap buyers in the West continue to pay ceiling prices for No. 1 heavy melting and in many cases find on delivery they have bought No. 2. Buyers are becoming increasingly bitter.

Dealers contend they are making every effort to comply with grading practices but that the amount and the quality of material they are able to collect is none too good and their handling costs are stiffer than ever before.

Presenting: A NEW HOT WORKING DIE STEEL
FOR PRESSES AND UPSETTERS—

PRESTEM



PRESS DIE INSERT



PRESS DIE



UPSETTER DIE

... ANOTHER Heppenstall "FIRST"!

The makers of Hardtem—first prehardened die block for drop hammer forgings—now introduce "Prestem", a new steel analysis developed especially for the hot working of steels in forging presses and upsetters.

Prestem is available in the form of blocks and bars for solid press dies, insert dies, upsetter dies, and punches. It machines readily at high hardness . . . has high impact resistance . . . can be water cooled during forging operations.

Results obtained the past year by three large automotive forge shops indicate that Prestem dies withstand abrasion and wear at high temperatures . . . resist heat checking during long runs . . . continually produce better quality forgings.

The same steel can be obtained in the annealed condition and is distributed under the trade name Presneal. Write for the Prestem folder or call your Heppenstall representative for more information. Heppenstall Company, Pittsburgh 1, Pa. Sales offices in principal cities.

Heppenstall

—the most dependable name in die blocks



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the federal view

*this week in
washington*

by Eugene J. Hardy



No Public Scrap Drive—There may be an NPA-sponsored scrap drive of sorts this year, but it won't be aimed at the general public. NPA is now trying to get the facts on how much of a scrap deficit is in prospect for this year but the question to be answered is where and how to get it.

A public drive brings shudders to those in NPA who would be responsible for such a program, although there are some who feel that such a drive would serve to make the public mobilization-conscious. Householders were pretty well cleaned out during the last war and would have little to contribute to piles of bed springs, pots and pans, and bird cages which would do little more than provide eyesores in public squares.

Four Major Sources—Current efforts to bring in more scrap are being directed to the auto wreckers, municipalities (old trolley rails, bridges, etc.), and the reserve of World War II ships. Farmers will also be included.

NPA says industry could help a great deal, without any government compulsion, if plant managers would only dig out their copies of WPB's salvage manual and follow through on the suggestions it contains.

Current suggestions for a public drive for collection of tin cans, sparked by the Senate Preparedness Subcommittee isn't favored by NPA. NPA points out that tin

in tin cans has been heavily reduced and existing de-tinning capacity would provide only about 175,000 tons of steel scrap annually.

Less Warehouse Steel—Contrary to reports that more steel will be made available from warehouses, the opposite is true. The reason is that warehouses must bear the brunt of an expected flood of DO-97's under the recently established MRO program.

However, NPA is trying to work out a program under which warehouses will not be caught short during the beginning stages of CMP. A revision of the aluminum order is also in the cards to assure a better flow from mills to distributors and jobbers.

Ban on Contract Info—The small firm's best source of information for subcontracting leads would be extinguished if security-minded officials in the Dept. of Defense have their way and discontinue weekly listing of contract awards issued by Commerce Dept. field offices. THE IRON AGE publishes a weekly summary of these listings covering contracts in the metalworking industry.

Under military proposals which have already been put into effect, the firm name and product are being released but the quantity and dollar value of awards are eliminated. This greatly reduces the value of this service.

Steel Case Winding Up—The Federal Trade Commission's 3½-year price fixing charge aimed at the steel industry may be drawing to a close. Negotiations between steel attorneys and FTC have resulted in a second proposed cease-and-desist order which the industry has agreed to accept. This order was presented to FTC this week.

Unlike the first proposal, turned down last year, the new order does contain such findings and is likely to be accepted by the Commissioners.

To Defy Analysis—This would seem to end the freight absorption question, but the order would not stop FTC from proceeding with its theory of "conscious parallelism of action" which would make individual compliance with the order so thorny a problem as to defy analysis. Seemingly, it would be a difficult problem for two or more firms to absorb freight in the same amount to the same area and still stay within the limits of the proposed order.

The proposed order would also bar any fixing of prices; exchanging of price lists; publishing and distributing freight rate books; agreeing on classification of customers; and the use of the multiple basing point system. In addition, all producers would be required to sell f.o.b. mill to any customer.



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Schedule 10—Light Wall—Welded
Schedule 40—Standard Weight—Seamless & Welded

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RYERSON STEEL

COLD EXTRUSION OF STEEL

Effect of lubricants, tool contours and reductions

By HUBERT HAUTMANN

Translated from Archiv fur das Eisenhuttenwesen, August 1950

By W. M. Baldwin, Jr., Research Professor

Case Institute of Technology, Cleveland

The cold extrusion process is one of the discoveries born of the unconventional thinking of a man working outside his field. In 1935, A. Liebergold (German Patent 717679) of the Neumeyer Metal Works in Nuremberg ran a mild steel blank through the same tool setup used for the deep drawing of cartridge cases from 0.600-in. thick brass. The results were surprising and certainly no so hopeless as a steel man would have expected. To be sure, the drawn part had heavy cracks and was galled, but the finished article was successfully produced.

It was recognized that a suitable lubricant had only to be developed to repress the galling and the process would be a practical one. The discovery of phosphate coats—put on by the Coslett method—as a lubricant or lubricant carrier filled this need. From 1938 on, the Neumeyer process developed rapidly on a broad scale. It was used to finish form component parts, especially hollow shells with thick bases and thin walls. It was used also in producing tubular products with changing cross-sections. Later Bonderizing took the place of Coslettizing.

The process consists of effecting a heavy reduction in cross-section of a draw piece by extruding cold metal through a die with a punch. Various

forms of this basic method are shown in Fig. 1. This schematic diagram illustrates the arrangement of tools (die and punch) and the workpiece. The extrusion occurs either in the direction of the movement of the punch (Figs. 1a, b, c) or in the opposite direction (Figs. 1d, e) or in both directions (Fig. 1f). The cross-sections of the extruded parts are generally round, although ovals and polygons with rounded corners can be pressed. Articles with sharp corners cannot be produced. Sharp corners crack, since lubricants fail at these points. Parts which are difficult to form can be produced with segmented dies.

Minimum Wall Thickness Given

The minimum wall thickness of extruded cylindrical cross-sections and tolerances for various diameters are shown in the box. Extrusion pressures for a 75 pct reduction in cross-sectional area, for a low-carbon steel using a conical die with a 125° apex angle will go as high as 170,000 psi, calculated on the basis of the punch area. Tool life depends, of course, on the tolerances to be held, although 50,000 to 200,000 pieces are common. Hard chrome plating has been necessary on occasion. Until now, steels with carbon running from 0.06 to 0.3 pct and tensile

This summary of the latest information on the Neumeyer process shows that certain phosphate coatings are as good as the best electrolytic porous metallic coatings of zinc. Die apex angles from 40° to 180° have been tested. Small die angles gave lowest extrusion pressures and best metal flow. Tool contours were studied in extruding 25 different steels. Transverse toughness of steels reduced 85 pct are much higher than expected.

Cold extrusion—Neumeyer process

Continued

strengths of 50,000 to 75,000 psi have been extruded; the greater portion of production has been run on 0.06 to 0.12 pct C steels.

The effects of the lubricant, tool contour and the steel used for the workpiece on the extrusion pressure were studied. Further experiments covered the properties of the cold extruded steel. The first group of experiments was carried out on a 75 metric ton hydraulic press fitted with a manometer, and having a punch velocity of 10 ipm. The force-distance curves were obtained on a stylus recorder coupled to both the punch and the manometer. The dies were sometimes finished in one piece and sometimes split in two pieces to allow removal of the pressings at any arbitrary stage of the forming process. Die apex angles were varied over the range of 40° to 180° usually at the following preferred values: 40°, 90°, 126° and 180°.

Reduction of Area Studied

Solid rounds were extruded with different reduction through a die with a 110° die angle. Rounds with 70, 64, 56, 52 and 48 pct reduction in area were pressed from the same sized blank through different dies. Two experimental extrusions with a 90 pct reduction in area were made through a die with a 126° die angle. The starting diameter of the blank was 0.8 in., the extruded diameter was 0.23 in. The extrusion pressure on the punch was 250,000 psi.

Lubricants play an important role in cold extrusion. The lubricant must not only repress galling, but it will strongly affect the extrusion pressure. Lubricants normally used in drawing

FIG. 1.—Schematic drawings of different forming operations employing cold extrusion. The form of the blank is given in the upper left-hand corner of each drawing.

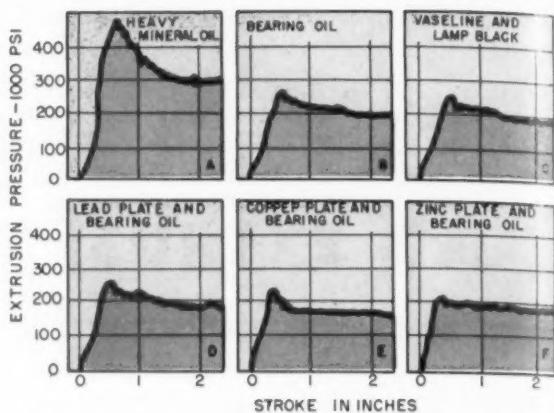
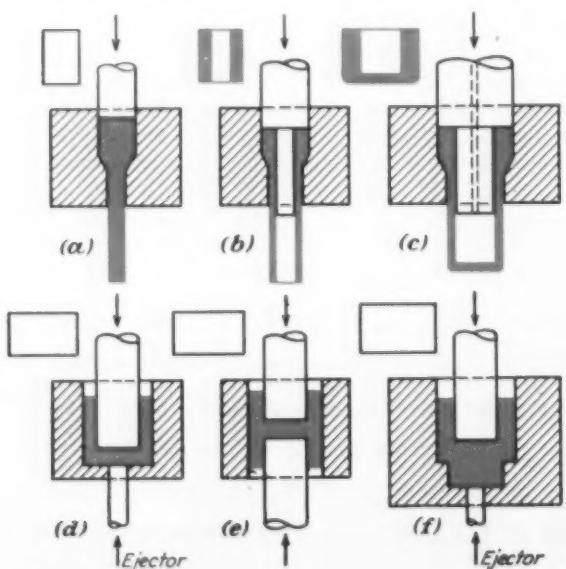


FIG. 2.—Effect of different lubricants on the pressure in cold extruding tubular test pieces (0.78 in. OD, 0.078 in. wall) with 75 pct reduction in area in a 126° die.

steel do not stand up at higher reductions. Tests made with soap-type or grease-type lubricants such as bearing oil, wool oil, vaseline and talc failed as well as those made with heavy mineral oils. Above all, the fatty lubricants failed on dies warmed up by continued extrusion. Improvement of the lubricity of oils can be obtained by adding lampblack or graphite, but hardly to a degree to permit practical exploitation.

Because of the high friction forces occurring in the die face, the use of salts or metals as lubricants appeared feasible. This speculation was supported by the known lubricity of various bearing alloys and the use of salts for artificial skating rinks.

Of the experiments on metallic coatings, those carried out with electroplated porous copper or zinc coatings gave the best results. The best salt coatings appeared to be the phosphates produced either by the Parker or Coslett process and iron oxide electrolytically deposited from an oxalic acid solution. These salts were comparable to the best metal lubricant, zinc. With either metals or salts, supplemental lubrication with oils or oil emulsions is advantageous.

Effect of Higher Temperatures

The success obtained with Bonderized phosphate coating in cold extrusion has led to its use in cold drawing of wire, rods and tubes. Metallic and salt lubricants have the advantage in that they do not lose their effectiveness with the increase in temperature that invariably occurs at the tool surfaces during forming.

Figs. 2 and 3 show some results of experiments carried out on different lubricants. These pressure-stroke diagrams were obtained on tubes extruded with 75 and 65 pct reduction in area through a 126° die. The curves show a sharp peak at the beginning of the process up to the moment when the front of the blank has reached the smallest cross-section of the die opening. The pressure drops when the extrusion process proper sets in—at first abruptly, and later gradu-

ally—to what appears to be a constant minimum value.

The effectiveness of the lubricant was judged from the value of the extrusion force (minimum). Heavy mineral oil gave an extrusion pressure of 280,000 psi for a plain 0.05 pct C steel tube extruded 75 pct reduction in area on a cold die. Bearing oil on a bare surfaced blank dropped the extrusion pressure to 200,000 psi all other conditions being the same. Vaseline with 30 pct lampblack added dropped the extrusion pressure slightly though the starting pressure remained unchanged. On warm dies (results now shown) the effectiveness of the latter two lubricants fell off badly. On a die warmed to 300°F the bearing oil or vaseline with 30 pct lampblack gave pressure-stroke charts similar to that obtained with heavy mineral oil on a cold die.

Examples of the behavior of metallic lubrication for the same experimental conditions are given in d, e and f of Fig. 2. Extrusion made with copper or zinc-plated surfaces with supplemental oil lubrication gave the lowest extrusion pressures. Lead plated surfaces with additional lubrication required higher pressures. The advantage of metallic lubricants did not consist alone in the fact that they gave extrusion pressures that were lower than obtained with grease-type lubricants, but that the pressure-stroke diagrams shown in Figs. 2d, e and f remained unchanged for dies at higher temperatures.

Metallic Lubricants Compared

Comparison of the effectiveness of the best metallic lubricants with a phosphate coat produced by the Colet process can be made in Fig. 3. Tubes of three different steels were extruded

FIG. 3—Effect of different lubricants (copper-plate, zinc-plate, and phosphate coat) on the pressure in cold extruding steels of different composition (cf. Table II) into tubes the same as in Fig. 2 except with a 65 pct reduction in area.

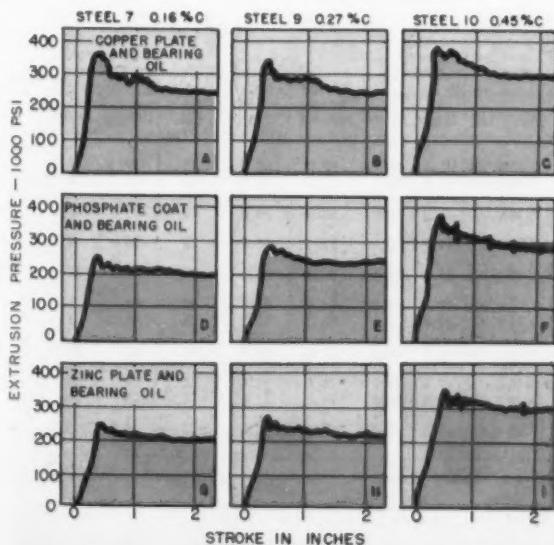


TABLE I
MINIMUM THICKNESS AND TOLERANCES
of cold extruded cylindrical cross-sections

Inside Diam. in Inches	Min. Wall Thickness, In.	Tolerance, In.
0.4 to 0.8	0.020	±0.002
0.8 to 1.8	0.030	±0.004
1.8 to 3.2	0.040	±0.006
Over 3.2	0.080	±0.008

to a 65 pct reduction in area through a 126° die. The analysis and properties of steels are given in Table II (steels 7, 9 and 10). The pressure-stroke curves for copper plate plus grease-type lubrication (Figs. 3a, b, c) lie slightly above those for phosphate coat plus grease-type lubrication (Figs. 3d, e, f); zinc plate plus grease-type lubrication and phosphate plus grease-type lubrication give just about the same pressure-stroke curves. These relative standings apply to the harder steels as well as the softer ones. Of special interest is the fact that the extrusion pressure does not increase in direct proportion with the yield strength or tensile strength of the steel, but actually at a lower proportion. This must mean that the effectiveness of the lubricants is improved at higher pressures.

Phosphate Coatings Easily Removed

Articles extruded with a phosphates surface take on a light gray sheen, while those extruded with copper plate or zinc plate become mottled. A suitable surface finish is obtained only with heavy plating. Phosphate coats are most easily removed by pickling. This is a distinct advantage over zinc plate which is quite difficult to remove in finishing operations.

Further experiments on the effect of copper, zinc, and phosphate coatings on extrusion pressure are given in Fig. 4. A number of steels with carbon contents ranging from 0.04 to 0.57 pct were extruded to tubular shapes through a die having a die angle of 126°. The reduction in area was 80 pct. The final tubes were 0.8 in. ID and the tube wall was 0.017 in. The extrusion pressures increase with the carbon content of the steels. The slight upward jog in the curves at 0.33 pct C may be attributed to the fact that below this carbon content the steels were not killed while above this value they were killed. Except for this discontinuity, the extrusion pressure increases almost linearly with carbon content. This experimental series also shows how copper plate gives the highest extrusion pressure and zinc plate the lowest.

Effect of Tool Contours

Extrusion pressures also depend upon tool contours. The flow of material in the extrusion die is similar to that in a drawing die. The core of the extrusion flows much faster than the edges. Rupturing of the core, however, is nowhere near the problem in extrusion as it is in drawing.

Cold extrusion—Neumeyer process

Continued

Whereas internal rupturing virtually sets the limit of drawing, it is rarely found in extrusions.

Experiments on the effect of the die angle show that the lowest extrusion pressure and the most favorable metal flow are obtained with dies with the smallest die angles. On the other hand, the stressing of the dies, from radial pressure exerted by the workpiece, is greatest at low angles and the danger of fractured dies becomes a problem. The most commonly used die angle in practice is between 125° and 130° and was chosen with regard to the stressing of the die itself. Extrusion pressures and the properties of the extruded steel were secondary considerations.

Insertion of dies in tougher die rings should be made as complete as possible to insure them against failure. This permits smaller die angles and therewith lower extrusion pressures and better properties in the finished part.

An experimental series, illustrating the above facts, was carried out on 25 different steels of which 11 of the more important are listed in Table II. Here are listed the chemical composition, the tensile strength and the impact strength, in both unaged and aged conditions, of rimming, killed and aluminum-bearing plain carbon steels as well as free-machining steels. Carbon contents ran between 0.08 and 0.50 pct, tensile strengths between 50,000 and 110,000 psi. Blanks 1.5 to 4.0 in. diam were turned down from rolled rod and then normalized. The aluminum-killed steels were cooled in air from the normalizing temperature at better than 10° per min on passing through the A₁ point. They behaved nonaging when deliberately put through aging conditions.

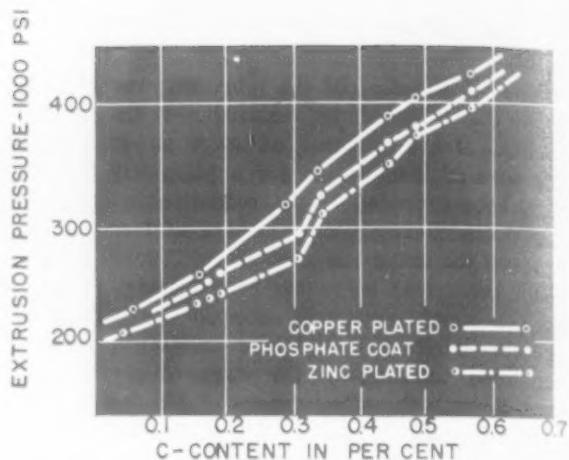


FIG. 4—Extrusion pressure as affected by lubricant and carbon content of the steel. Tubes with 0.78 in. ID and 0.11 in. wall were extruded with a reduction in area of 80 pct.

Steels 1 and 8 correspond to the softest and hardest aluminum-containing special steels that could be used commercially. For milder extrusions, steels 2 and 7 were chosen. The free-machining steels 5, 6 and 9 are of interest for combined production methods (extrusion and machining), but are not used in large quantities. Plain carbon steels 10 and 11 with 0.45 and 0.50 C pct are used in small quantities, too.

Killed Steel Most Sensitive

The experiments were carried out on dies with 40°, 90°, 126° and 180° angles. Blanks 0.8 in. diam were extruded with 65 pct reduction in area to rounds 0.464 in. diam. Blanks were Bonderized and given supplemental lubrication. Vickers hardness tests on the cross-section and Izod impact strength were taken on the parts as cold extruded and as aged 1 hr at 250°C.

TABLE II
STEEL ANALYSES AND MECHANICAL PROPERTIES

Running Number	Designation	Diameter or Thickness, inches	Heat Treatment	Chemical Composition								Yield Strength, 1000 Psi	Tensile Strength, 1000 Psi	Elongation, L=5d Pct	Reduction in Area—Pct	Impact Strength ¹ , Ft.-Lbs.		
				C	Si	Mn	P	S	Al	Cu	Ni					Unaged	Aged ²	
1	Ma 5	1.5	Normalized	0.08	0.07	0.33	0.019	0.022	0.059	0.11	0.006	35.6	34.2	50.0	40.0	75	122	110
2	MK 7	1.5	Normalized	0.10	Trace	0.41	0.025	0.033	....	0.13	0.008	29.4	29.4	51.0	37.0	62	90	5
3	Non-aging Boiler Plate I	1.5	Normalized	0.09	0.10	0.53	0.024	0.032	0.025	0.14	0.007	31.8	31.8	52.5	39.0	64	108	85
4	Killed Boiler Plate I	1.5	Normalized	0.11	0.10	0.45	0.020	0.032	....	0.12	0.009	34.2	32.8	55.	37.0	70	95	7
5	15 S 20	1.5	Normalized	0.12	0.22	0.68	0.035	0.138	0.054	0.15	0.009	37.8	37.8	60.5	32.0	53	82	40
6	Non Aging Manganese free-cutting steel.	1.5	Normalized	0.12	0.12	1.43	0.026	0.148	....	0.14	0.008	40.0	40.0	61.5	28.0	44	105	25
7	CK 15	1.5	Normalized	0.16	0.12	0.48	0.028	0.032	....	0.12	0.007	42.5	41.4	63.0	30.5	65	90	7
8	Non-aging Boiler Plate IV	1.5	Normalized	0.24	0.28	0.50	0.041	0.029	0.040	0.11	0.006	45.6	41.4	71.8	29.2	58	82	50
9	Non-aging free-cutting steel.	1.5	Normalized	0.27	0.26	0.73	0.038	0.200	0.057	0.15	0.006	47.0	47.0	74.0	31.0	57	71	52
10	C 45	3.92	Normalized	0.45	0.24	0.80	0.043	0.031	....	0.10	0.007	55.0	55.0	98.0	21.0	38	18	5
11	T 45 Thomas Rail Steel	3.92	Normalized	0.50	0.20	0.90	0.058	0.028	....	0.06	0.018	60.5	60.5	110.0	17.5	30	4.5	3.5

¹—These data were obtained with a DVM-Test specimen and reported in kilogram-meters/square centimeter. The reported values have been multiplied by 5 which converts DVM readings to Charpy values reasonably well.

²—Compressed 10 pct., annealed 1/2 hour at 250°C. Notch perpendicular to surface.

The experimental results are given in Fig. 5. The extrusion pressure and Vickers hardness increase in the case of every steel as a larger die angle is used. The impact strength drops, however, especially in the case of the harder steels. The steel most sensitive to changes in die angle is the killed steel specially prepared for cold extrusion (steel 1).

The extrusion pressure increases with increasing strength of the steels. The ratios of extrusion pressure to lower yield strength and extrusion pressure to tensile strength are collected in Table III for the four different die angles and can be used to interpolate the extrusion pressures required with any die angle. The average pressure required to extrude a blank 65 pct through a die having an angle of 126°—the angle most commonly used in practice—is 5.1 times the lower yield strength of 3.1 times the tensile strength of a normalized steel. The ratio drops with harder steels.

Effect of Die Angles on Hardness

For the 65 pct reduction, the hardness is 5.5 to 6 times the value of the tensile strength when a 126° die angle is used. With the smallest die angle, 40°, the hardness number lies between 4.5 and 5 times the tensile strength. Increasing the die angle from 126° to 180° does not affect the hardness very much.

The impact strength values of the extruded parts are extraordinarily high. In the case of steels 10 and 11, the starting impact strengths are exceeded, in all other cases the toughness of the artificially aged tests (Table II) is reached.

The effect of relief annealing after the extrusion, 1 hr at 480°F, on the impact strength of the extruded rods is not clear. Undoubtedly the values are affected by relief of residual stresses. Only in this manner can the many cases where the toughness of the aged steels exceeded that of the untreated steels be explained. Impact strength like hardness is affected most strongly by the die

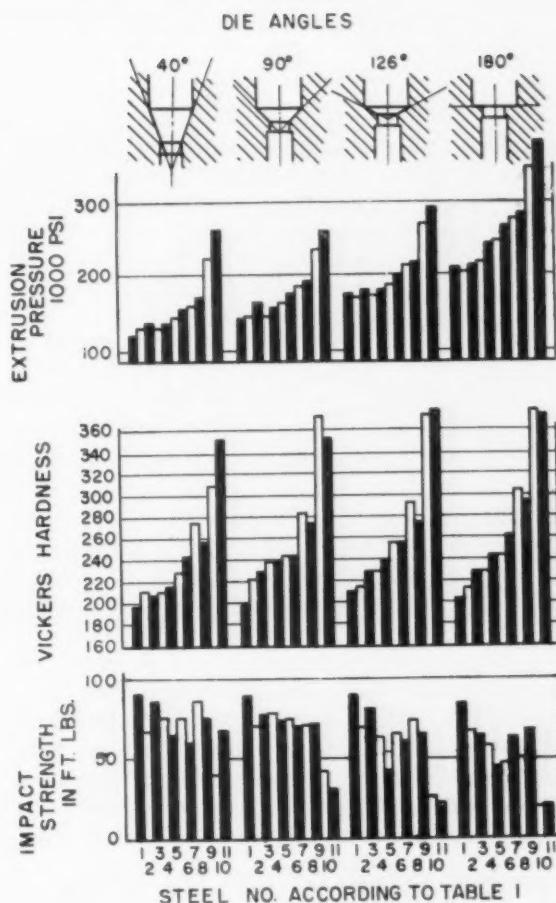


FIG. 5—Effect of die angle on the extrusion pressure, hardness and impact strength of 4.6 in. cylinders extruded with 65 pct reduction in area from the different steels in Table II. The blanks were Bonderized.

angle changes in the neighborhood of 90° to 126°.

The same 25 steels used in the previous experiments were studied to determine the effect of area reduction on extrusion pressure and on impact strength. Fig. 6 presents the results

TABLE III
EXTRUSION RATIOS v. DIE ANGLES

Ratios of extrusion pressure to lower yield strength and to tensile strength for extruding rods (0.465 in.) of various steels (see Table I) through dies having different die angles.

Number	Steel Designation	Extrusion Pressure				Extrusion Pressure			
		Ratio Lower Yield Strength				Ratio Tensile Strength			
		Die Angle in Degrees				Die Angle in Degrees			
		40	90	126	180	40	90	126	180
1	Mn 8	3.5	4.2	5.1	6.2	2.4	2.9	3.5	4.2
2	MK 7	4.5	5.0	5.8	6.8	2.7	2.9	3.3	4.0
3	Non-aging Boiler Plate I	4.4	5.2	5.7	6.7	2.6	3.1	3.5	4.0
4	Killed Boiler Plate I	4.0	4.5	5.3	6.7	2.4	2.7	3.2	4.0
5	15 S 20 Non-aging	3.8	4.4	4.8	6.6	2.3	2.6	3.0	4.1
6	Manganese free-cutting steel	3.6	4.1	4.7	6.2	2.3	2.7	3.1	4.0
7	CK 15	3.8	4.2	4.8	6.5	2.4	2.8	3.2	4.2
8	Non-aging Boiler Plate IV	3.9	4.5	5.2	6.8	2.3	2.8	3.0	4.0
9	Non-aging free-cutting steel	3.6	4.1	4.7	6.1	2.3	2.6	3.0	3.9
10	C 45	4.1	4.3	5.0	6.3	2.3	2.5	2.8	3.6
11	T 45 Thomas Rail Steel	4.3	4.3	4.9	6.4	2.3	2.4	2.7	3.5
	Average	3.8	4.4	5.1	6.5	2.4	2.7	3.1	3.8

obtained on the 11 steels listed in Table II. For these experiments dies with 126° die angles were used; 0.4-in. diam rods were extruded; the blanks were Coslettized. As the extrusion pressure increases almost in direct proportion with the reduction in area for each steel the pressure is higher for the harder steels.

For purposes of calculating the extrusion pressure, the ratio of extrusion pressure to tensile strength is the better, since it shows less scatter. In this experimental series as in previous ones, it was noticed that the extrusion pressure did not increase in direct proportion with the tensile strength. From all the data given above an empirical formula can be assembled for calculating extrusion pressures: Extrusion pressure (in psi) = (area reduction - 10) × 0.054 × tensile strength. The extrusion pressure determined for individual steels and at individual reductions lie very close to straight lines on a log-log plot. A grouping of the results for steels with 0.08 to 0.12 pct, 0.12 to 0.27 pct, and 0.45 to 0.50 pct C gives three straight parallel lines. These relationships originally determined on round rods are valid for the extrusion of tubes.

Aluminum Changes Extruded Properties

As may be seen in Fig. 6, the aluminum-killed and the nonaluminum containing steels behave differently as far as impact strength is concerned. In the aluminum-free steels, the impact strength is low at small reductions and increases at high reductions. The impact strength of the aluminum-killed steels on the other hand drops to a minimum in the range of reductions of about 50 pct. Beyond 75 pct reduction, the impact

Testing steels for cold extrusions

To test the formability of steel in different conditions or the relative formability of different steels a test in which a cylindrical specimen is pressed against a hole drilled into a plate. The hole has a diameter equal to one-half that of the test cylinder and a carefully rounded edge ($r = 0.010$ inch). The flattening of the cylinder and the depth of penetration into the drilled hole are measured at different stages of compression. These two quantities are determined continuously throughout compression with suitable instrumentation. The formability is expressed as a ratio of the flattening to the penetration. The exaggerated grain growth that occurs in the critical deformation range of 12 to 20 per cent is interesting.

strength almost equals the starting impact strength of the metal. Examination of the fracture surfaces shows that increasing cold work develops a fibrous structure in those areas where at lower reductions a coarse-grained brittle fracture was found. Fissures which appear in the heavily worked specimens cannot be detected in the micro-structure.

Transverse toughness test of a tubular body with varying wall thicknesses (average 0.060 in.) and 1.8-in. ID. The average reduction in area produced during extrusion amounted to 85 pct. The transverse impact energy runs about 40 to 80 ft-lb per in.² which is quite high for a tensile strength of 114,000 psi. After a 1112°F anneal the impact energy rose to 200 to 320 ft-lb per in.² at 83,000 to 106,000 psi tensile strength.

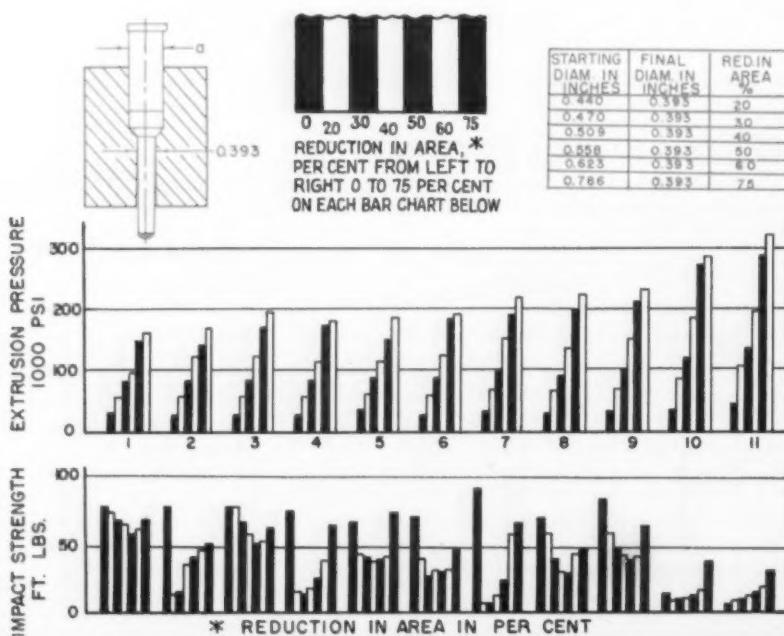


FIG. 6—Effect of type of steel (Table II) and reduction in area on extrusion pressure and impact strength. Final diameter of rods was 0.393 in.; die angle was 126°; the blanks were Coslettized. The bottom graph includes impact strength for zero pct reduction, while the top graph shows pressures for 20 to 75 pct reduction alone and does not include a sample for zero reduction.

AUTOMATIC TRANSMISSION CASTINGS CLEANED CHEMICALLY

By R. J. PETERS

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Borg-Warner Corp., Muncie, Ind.



LOADING AND UNLOADING station for the Kolene unit. One carrier, holding 42 transmission cases, is lowered to working level with a section of load-carrying rail. Cases on pallet in foreground are stress-relieved and ready for loading.

IN launching the manufacture of an advanced form of automatic transmission for passenger cars, Warner Gear Div., Borg-Warner Corp., gave considerable thought to the problem of cleanliness so vital in the operation of an automatic transmission. For example, the transmission case, a gray iron casting of considerable design complexity, has many pockets and corners inaccessible to conventional cleaning or blasting methods. Yet it is imperative to have clean castings absolutely free from foundry sand.

Starting with this concept of absolute cleanliness, three major castings were selected—the transmission case, planet cage, and coupling—for chemical cleaning before machining. In addition, the transmission case is given an initial stress-relief treatment before cleaning to stabilize the structure and assure close dimensional tolerances in the machining stages.

The cleaning process selected for the purpose is an application of the well-known Kolene technique. Briefly, cleaning is done in an automatic cycle, self-contained unit using Kolene No. 4 reducing salt bath of the electrolytic type. Not

only does this process dissolve all sand in the pockets of the castings, it also dissolves all sand inclusions in the surface of the castings. Moreover, it has been found that Kolene removes rust and scale at the same time.

Another by-product of the process is that it serves as a positive means of checking casting quality. In the process of dissolving sand and removing rust and scale, this method of cleaning uncovers surface defects such as porosity and cracks, defects which ordinarily remain undetected until machining cuts are taken. This has a salutary effect on improving foundry practice, preventing loss of time and productive labor in machining.

Greatly Reduces Tool Breakage

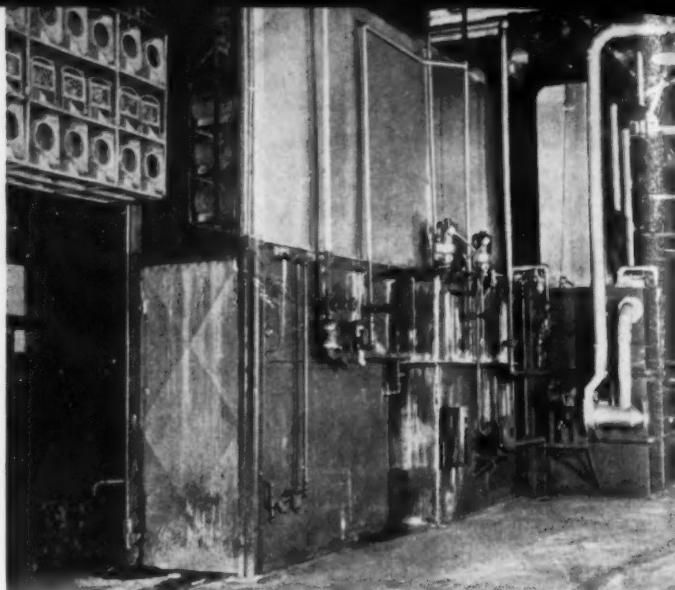
Machinability has been greatly improved and tool life extended by the preparation of clean metal surface free from sand and scale. At the same time tool breakage, which can be responsible for shutting down a transfer machine line, is virtually eliminated.

The Kolene unit, developed in cooperation with

A new adaptation of the Kolene cleaning technique produces gray iron automatic transmission castings of unusual surface quality. Surface sand inclusions are dissolved, and all scale and rust are removed. Machine shop rejects are minimized, since the process uncovers porosity and cracks for visual inspection.



THE LOAD RAIL with the loaded carrier has raised to the "up" position; the entire unit is now going through the forward cycle.



KOLENE UNIT as seen from the exit end, with carriers moving to the unloading station. Part of the Surface Combustion unit that heats the Kolene bath is at the right, and the hot rinse tank is at left foreground.

Chemical cleaning

Continued

Warner Gear, is a self-contained machine consisting essentially of three individual baths: The first is Kolene No. 4 salt bath; the second, an agitated fresh cold water rinse; the third, a hot water rinse. The cycle of operations is completely automatic, served by a heavy duty Jervis B. Webb monorail conveyor system. The closed conveyor system contains 14 special carriers, each designed to hold a total of 42 cases. Since each case weighs 42 lb, the total load per carrier is around 1764 lb. Average floor to floor time is around 20 min per carrier load.

Smaller parts are loaded in special baskets that fit in the space for two cases, thus accommodating 21 basket loads per carrier. Each basket holds about 80 lb of parts to assure a standard carrier loading of work at all times. Before cleaning, all transmission cases are given stress relief treatment in a Hagan gas furnace;

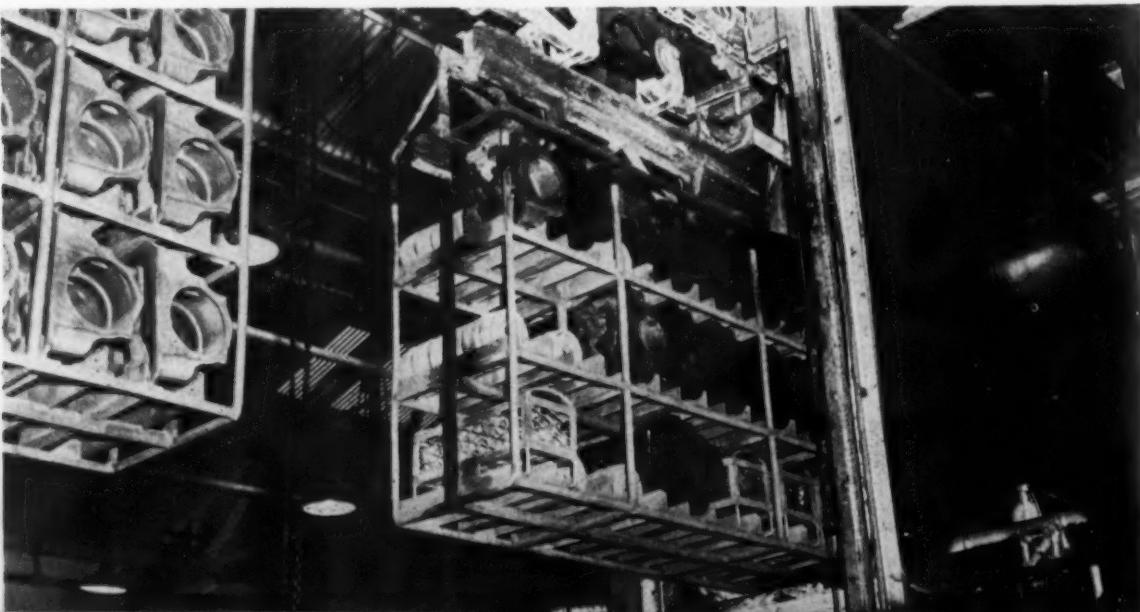
work is held in the furnace for 2 hr at a temperature of 1100° F.

The Kolene bath—the first unit at the loading end—uses Kolene No. 4, a catalyzed molten salt bath containing sodium hydroxide as the basic solvent. The bath is held at a temperature of 825° to 900° F, controlled by Leeds & Northrup Micromax recording instrument. The bath is heated by means of Surface Combustion atmospheric gas burner equipment; the flame is introduced through five specially designed immersion tubes mounted in the tank.

Bath Is Electrically Energized

The salt bath is energized electrically by means of a Udylite rectifier installation having a maximum output of 4500 amp at 6 v dc. Current is applied only for chemistry, since this is not a plating bath. The amount of current required is quite moderate, about 57 kw-hr handling 2½ carrier loads per hr. The amount of heat required is also moderate—around 2½ million Btu per hr max. In operation, whenever the

A LOADED CARRIER entering the cleaning unit. The hydraulically-operated door is in the "down" position



Working Cycle of Kolene Unit

- 1 Unloading and loading of the carrier.
- 2 Simultaneously raising the loaded carriers.
- 3 Sealing doors at the loading and exit ends.
- 4 Automatic advance by one station, at a rate of about 11 fpm.

salt, work, and negative current make contact, nascent reducing members are formed which dissolve sand and scale. Oxidation members are formed at the opposite pole (the pot) while reducing elements are formed at the work.

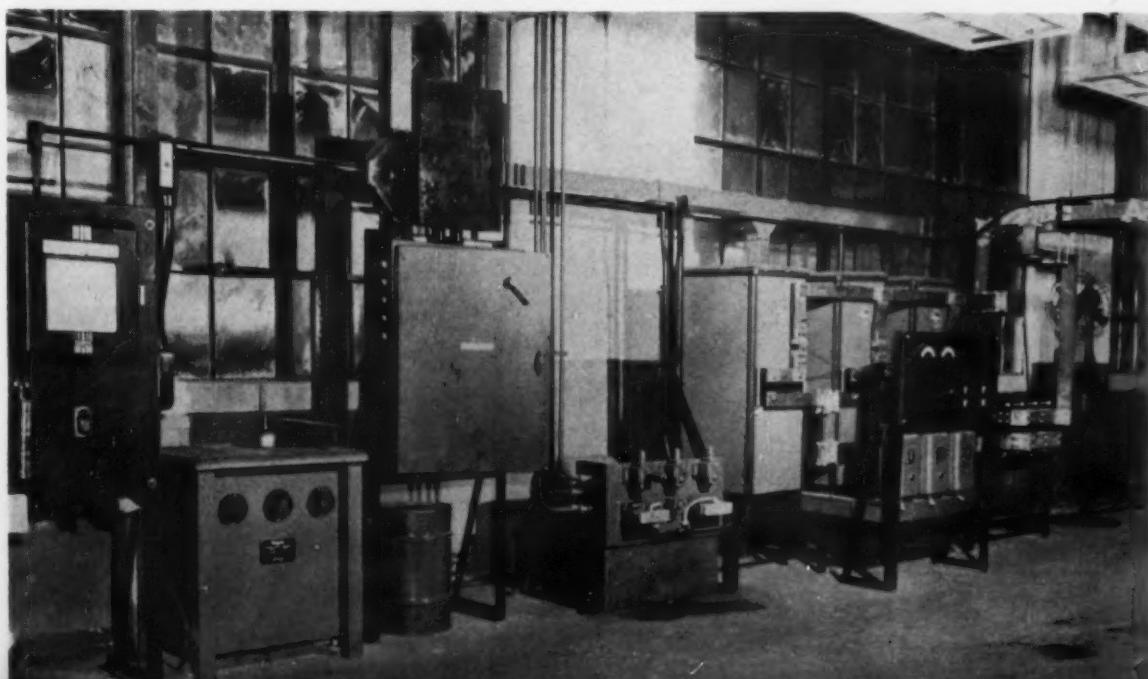
Dissolved sand, oxides and other impurities sink to the bottom of the pot, where a suitable sludge disposal pan is provided for the collection and disposal of the residue. Sludge disposal as well as addition of cleaner is handled in a separate zone at the rear of the unit, making it possible to take care of these service operations without interfering with the operation of the unit in any way. A sludge pan is arranged for easy removal, and usually is removed about once a week. No chemical additions are made to the Kolene bath, except for replacement of dragout.

Conveyer Operates Automatically

The second stage of the unit is the water rinse into which the work is immersed immediately upon leaving the Kolene bath. This 900-gal tank is provided with a free-flowing supply of fresh water. To assure intimate rinsing of the work, the tank is fitted with two power-driven agitators, which give mobility to the bath. The hot water rinse—the third and final stage—has a capacity of 900 gal and is heated by steam to a temperature around 180° to 190° F.

The automatically-operated conveyer system is another of the major features of the installation.

SERVICE AND CONTROL instruments. From left to right are: L & N Micromax temperature recorder and control; cabinet for Udylite unit controls; electrical control panel for automatic cycling of the Vickers unit; and Udylite rectifier system.



IMMERSION TUBES for heating in the Kolene tank are a specially-designed system. The gas flame is induced into the tubes by suction fans.

Loading and unloading is done at one station; at this point, the carrier as well as a section of the load-carrying rail is raised and lowered by means of a hydraulic cylinder. While the carrier is lowered for unloading and loading, the entire conveyer system is stopped.

Similarly, the carriers in the three zones of the cleaning bath are simultaneously lowered to immerse the work in the three baths, and raised when the cycle is completed. This operation is performed by another hydraulic cylinder. The working cycle is outlined in the box.

Three sets of hydraulic cylinders are involved in the operation of the unit; these are arranged for a specific sequence of cycling. The hydraulic system is controlled with a self-contained Vickers unit installed at the side of the machine. Another electrical control cabinet is arranged at the side for controlling the intermittent operation of the conveyer system.

The entire unit is sealed and protected by means of an exhaust system overhead.

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INDUCTION HEATING SUCCESSFULLY SOLDERS

aluminum

Accurate temperature control is a "must" when soldering aluminum, and in the setup described here induction heating provided uniform heat diffusion and eliminated oxidation problems. A high-strength bond was obtained at a rate of 320 pieces per hr.

The most exacting requirement in soldering aluminum is the control of temperature, and the necessary accuracy is possible with induction heat. The surrounding work coil used in induction heating to produce the desired temperature does not cause excessive thermal expansion in 2S alloy. No distortion occurs and aluminum's rapid heat diffusion assists in producing the heat pattern developed to solder this alloy. Spot-heating, which cannot be avoided when irons or torches are used, greatly complicates the soldering problem and often necessitates complicated, expensive fixturing.

Results are uniform when induction heat is used. Variables are eliminated and the simplicity of fixtures that can be used to join small parts should indicate to design engineers the desirability of this newer method. The rapid

oxidizing characteristic of this aluminum alloy has always presented the major problem in solder applications. With induction heat, oxidation is accurately controlled, making it possible to produce a perfect bond in the soldered joint.

Using high frequencies in the range of 450 kc as a heat source, perfect soldering results are possible. These frequencies produce a heat pattern that blends with the low melting point, high conductivity and low resistivity of aluminum.

One successful application of the new process involves the joining of brass to aluminum, using 2S alloy. The parts consist of an aluminum name plate, to which are soldered two threaded brass studs. The soldering operation must not distort the piece, or affect the surface in any way that might be detrimental to finishing operations and the appearance of the finished plate. The



THIS ROTATING, 24-station table, with two induction heating coils, turns out 320 nameplate-and-studs assemblies an hour.

plate, brass studs, solder squares and the fixture used are shown on the back of a finished plate showing stud location.

Plate dimensions are $4\frac{1}{2} \times 2\frac{7}{16} \times 0.040$ in. Studs are $\frac{3}{8}$ in. long and have a 0.156 in. diam. Head diam is 0.355 in. The plate is both embossed and debossed and has a flange of varying depth, not exceeding $\frac{1}{4}$ in. around the periphery. With the plate in position for soldering, it extends over the ends of the fixture $\frac{1}{4}$ in. and at the top of the plate, where the flange is deepest, it is protected by Transite to a depth of $\frac{1}{8}$ in. On the opposite side, where the flange is shallow, the fixture extends beyond the plate $\frac{1}{8}$ in.

Fixture Prevents Burning

This fixture design protects the flange at its vulnerable points and prevents burning. The positioned plate touches the fixture at the top of the plate only, where the deepest part of the flange is located. Readied for soldering, it also rests on top of the two brass studs to which it is joined. This provides a three-point location, which satisfactorily maintains the correct position during soldering.

In loading the fixture the operator places the two studs in the holes provided in the fixture, threaded ends down. The head diameter of the stud provides sufficient surface for an excellent bond. At the points where the studs are to be soldered to the plate, there is no debossing and the surfaces are flat. Whenever possible, such an arrangement is desirable, since it usually results in a 30 pct saving in solder.

Specifications for the spacing of the studs are ± 0.005 in. Fast assembly-line production requires that this tolerance be held. Side wear in the stud holes, caused by the stud threads rubbing against them as the operator removes the nameplates from the fixture, made holding to the specification a problem at first. A method of regularly inspecting the soldered units was then set up. The operator checks one fixture for each revolution of the 24-position rotating table used for assembly and joining operations. An extra fixture was kept available so that the one requiring repair could be replaced without stopping the table.

Fixture Design Is Flexible

The stud holes are drilled in $7/16$ -in. diam Transite rod. These are pressed into holes provided in the fixtures. This design makes it possible to press out a worn bushing with a new one (see bushing at left in fixture, Fig. 1) and drill the new stud hole in a matter of minutes. This method of repair does not deteriorate the fixture or shorten its life.

Aluminum's rapid cooling characteristics also helps to maintain the specified stud spacing. The cooling of the plate and the hardening of the solder occur simultaneously. The characteristics of the 2S alloy respond to induction heating more readily than other metals. Molecular response to

high frequencies and the absence of stress during the heating cycle make it an ideal material for the process. Ordinary degreasing of the parts prepares them for induction soldering. A temperature rise of several hundred degrees above the solder-flow point eliminates all the difficulties experienced with oxidation when other solder methods are used.

To produce this successful heat pattern two work coils are employed. Round copper tubing, $\frac{1}{4}$ -in. diam, is bent around a wood form rectangular in shape, $6 \times 4\frac{3}{8}$ in. Corner radii are $\frac{3}{4}$ in. and each coil has six turns. The proximity, or so called "coupling," of the work coil to the piece when in the heating position, is $\frac{1}{2}$ in. This is the dimension at the vertical centerline of the plate, while the coupling at the ends of the plate is $\frac{3}{4}$ in. Work coils of this size function best when the spacing between the coils, or turns, are held constant. This is accomplished by tying with asbestos or glass cord. Even better construction is provided by Transite corner posts. In the present setup, corner posts give an added advantage in the first heat stage. They absorb some of the current at these points of concentration, preventing too high a heat at the corners of the plate. In this first heat stage the greatest rise in temperature occurs. By raising the temperature only to an intermediate point in this first stage and then completing the heating process in a second work coil, a better bond and a higher production rate are obtained.

1000° F Maximum Soldering Temp.

At the end of the heat cycle in the first stage, the work coil rises and the table indexes to the second position. The work coil now descends, surrounding the fixture, and the heat is automatically turned on. Aluminum alloy 2S has an approximate melting point of 1220° F. This characteristic allows the use of temperatures up to 1000° F for the soldering operation. All oxidation is eliminated by this temperature.

The solder used is 40 pct tin, 60 pct lead, made by the Farrelloy Co., Philadelphia. It remains solid to 400° F and is fluid at 460° F. Flux is very important and best results are obtained by using the flux recommended by the solder manufacturer. Removal of flux residue is accomplished by dropping the piece into a cold solution of 5 pct sodium bicarbonate. With this method, the pieces can wait indefinitely before further proceedings. Pieces which have been torch-soldered will corrode unless processed immediately. The hexagonal solder sticks, furnished by the manufacturer, are rolled to the correct thickness and cut to size, $\frac{1}{4}$ -in. sq x 0.020-in. thick.

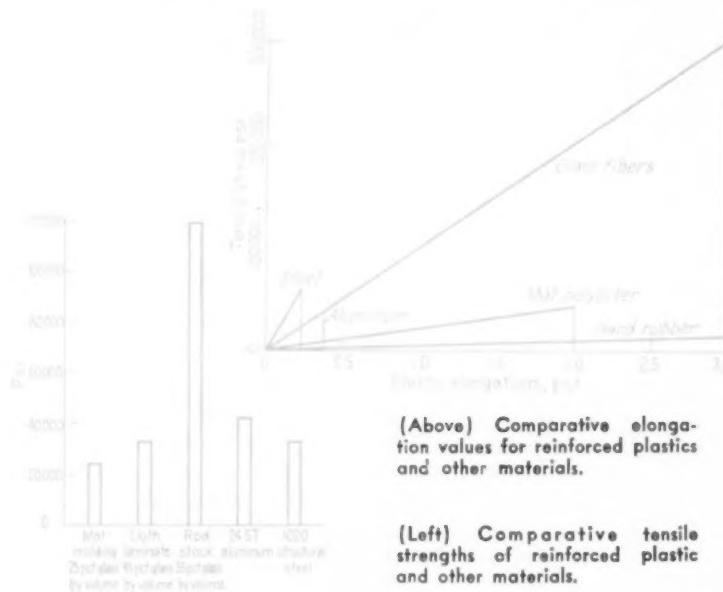
During soldering, in both heat stages, pressure on the plate is necessary to assure a strong bond in the soldered joint. Since the plate rests on the studs and touches the fixture at one other point only, this pressure must be applied directly over the studs.

Reinforced plastics have high impact and tensile strengths

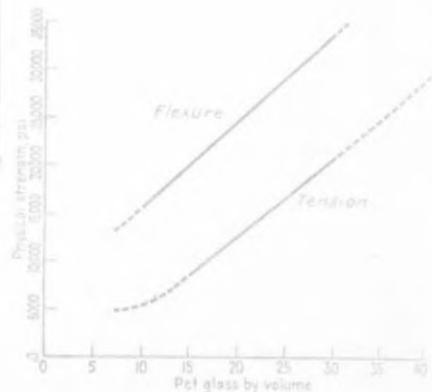
AT the recent Annual National Conference of The Society of The Plastics Industry, C. E. Bacon, manager of the Plastics Development Laboratories, Owens-Corning Fiberglas Corporation, Newark, Ohio, described some of the new developments in the compression molding of reinforced plastics. The tensile strengths, impact strengths and other properties obtained in these

strands or rovings, can be used to reinforce any commonly used plastic resin. The percentage of glass content also effects the strength of the finished plastic, as shown below. For example, the flexural strength of a molding can vary from 10,000 to 35,000 psi as the volume of glass fibers is increased from 5 to 35 pct.

It is generally the end use of the finished prod-



(Below) Relationship of glass content in reinforced plastics to physical strength.



materials makes the possibility of using them for highly stressed parts a distinct possibility. Glass fibers in themselves have long been known to exceed even piano wire in strength, and plastic rod stock reinforced with them has almost four times the tensile strength of structural steel. Their elasticity is also high, permitting a stretch of 3 pct before breaking.

Glass fiber, in the form of yarns, mats, cut

product that determines which form of glass fiber is best. Yarns are used in the fabrication of fishing rod stock, while fabrics are employed in those aircraft parts where a high strength-to-weight ratio is required. Reinforcing mats are used for flat plastic sheets and in formed parts where the contour is not critical. Cut strands and rovings are used for those moldings involving complicated cross-sections.

Two new elements confirmed

Confirmation of two new artificial elements has been announced by the Bureau of Standards. The two—known as technetium (Tc) and promethium (Pm)—are byproducts of uranium fission. Existence of the two was predicted in 1869 and in 1902, and reports of their discovery were made in 1925 and in 1926. However, sufficient quantities for positive identification have not been available.

With the operation of chain-reacting uranium piles in 1942 a new and efficient way of making the elements became available, and several milligrams of each of these fission products were delivered by the AEC to the Bureau of Standards in 1949.

Technetium, with an atomic number of 43, is a chemical homolog of manganese. Promethium is a rare earth metal and has an atomic number of 61. Studies of the optical spectra of these elements have been made at the Bureau of Standards and have revealed many properties of their atoms and nuclei. They have also provided reliable wavelengths and intensity data for about 5000 new spectral lines, the strongest of which are at least 1000 times more sensitive than their X-ray spectra. These optical spectral lines have given positive proof of the presence of these elusive elements, and knowledge of their optical spectral lines will aid the search for their presence in nature.

*Special
fixtures*

aid

DIECASTING

MACHINING

Some diecast electric typewriter parts require machining to improve dimensional accuracy and surface finish. These operations are performed, with one exception, on standard machines. But setups and fixtures are unusual and interesting.

Electric typewriters manufactured in the Poughkeepsie, N. Y. plant of International Business Machines Corp. include many diecast components. These are chiefly in aluminum alloy for light weight. Although dimensions, as cast, are as close, some castings undergo considerable machine work both to insure close dimensions and to obtain smooth surfaces.

Most of the machine work is simple and fairly conventional and all cuts are relatively light. There are, however, some operations that are not common, are unusually fast, or that involve unusual tooling. One such is a comb-like casting called a "cam lever bearing support" shown in Fig. 1. End portions of these castings require drilling and some reaming and tapping. This work is done in the special Kingsbury machine shown, as the castings are advanced along a

track through two stations where operations from both ends are performed.

Clamping at each station is done by an air-operated device actuated from a vertical air cylinder. Loading is done at the front end of the track, after which the parts are advanced automatically through the two working stations. Four pieces normally undergo machining at the same time, two in the first and two in the second station. There are four spindles, each operating several tools simultaneously. Each pair of spindles is in line, one at each end of the pair of workpieces.

Gearless Heads Are Used

Because some of the tools have to operate on unusually close center distances, conventional geared driving heads are not applicable. In-

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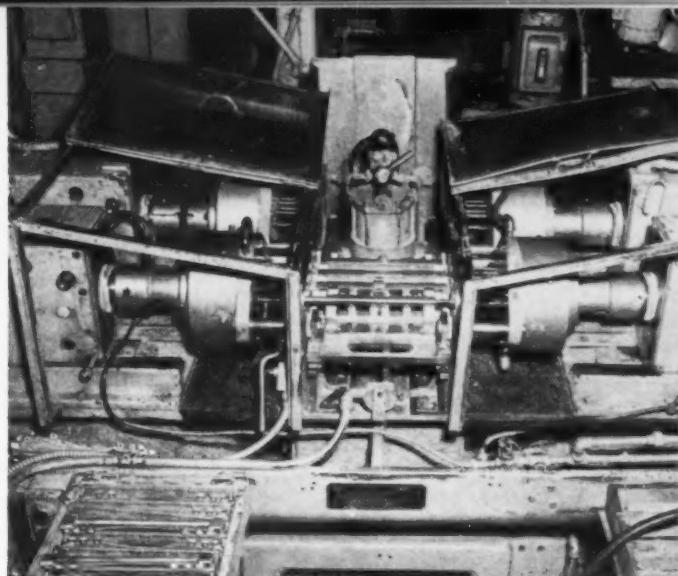


FIG. 1—Semiautomatic machine for drilling, tapping, and reaming holes in electric typewriter diecastings. Because of close center distances, gearless heads are used. Though only two are shown, this machine normally handles four castings.

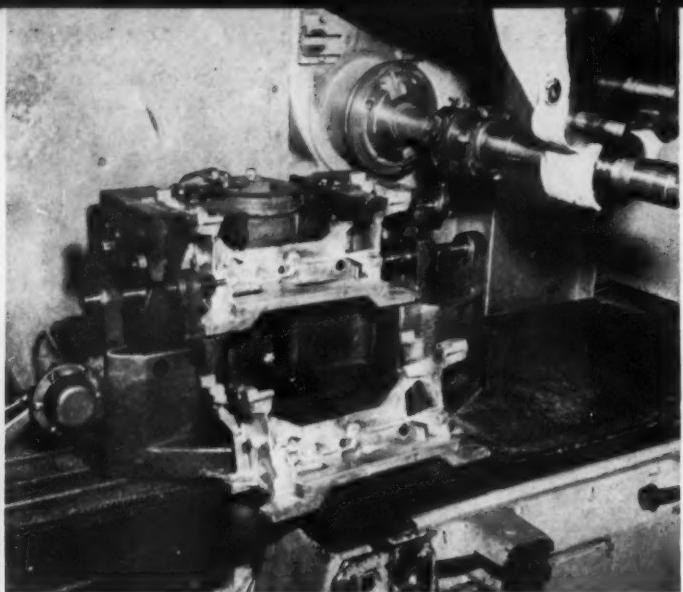


FIG. 2—Setup for straddle-milling electric typewriter power frame. Special air operated fixture holds casting securely without distortion. A simpler fixture might have distorted the thin-walled casting.

Diecasting fixtures

Continued

stead, Zagar gearless heads are employed here. The operator merely loads and unloads the castings in pairs, 60 pieces an hr being fed through the machine. This is far faster than the work could be done, even with multi-tool heads, if a two-way, four-spindle, two-station automatic machine were not employed.

Fixtures Prevent Distortion

Castings called power frames are among those on which numerous machining operations are required. This is a light casting not only because aluminum is used but because many sections are quite thin. It is essential, however, that distortion be avoided during machining, hence fixtures are designed to support securely those portions that might be distorted if tool pressures were exerted without rigid support. Once machining is done, the casting has ample strength and stiffness to perform its function properly in service.

Several portions of this power frame, shown in the foreground of Fig. 2, require milling. The first of these milling operations is done in the Brown & Sharpe machine, Fig. 2, on the arbor of which there are three carbide-tipped cutters. A floating air clamp is used in the box-like fixture so that the casting can accommodate itself to the fixture and still be clamped without distortion. One cutter produces a slot and the others mill, respectively, both horizontal and vertical surfaces for the carriage rail seat. To save time, the table feed is set to fast traverse after cutting at one end until the point where cuts begin at the opposite end is reached.

Two Sundstrand Rigidmills are employed for additional milling. The fixture used on one of these has a pair of air cylinders whose rams

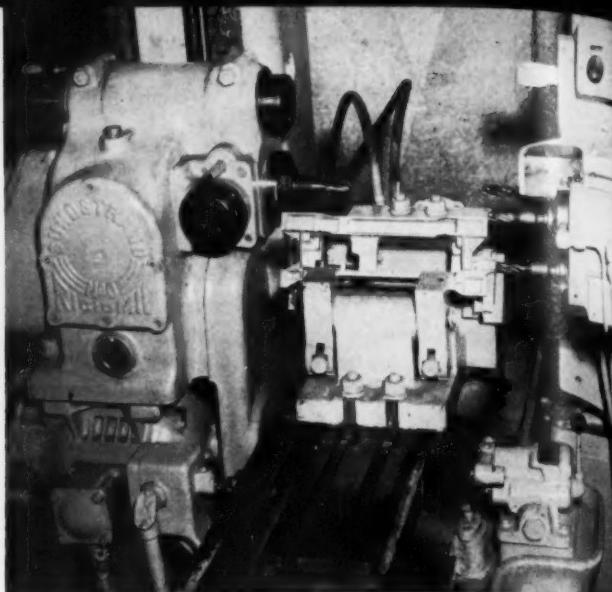


FIG. 3—Final power frame milling is done in this setup. One end mill at one side and two at the other are effective on the forward stroke. A fourth end mill moves in on the return stroke to complete the facing operations on this machine.

clamp the workpiece before the straddle mills finish the two ends of the casting, which is rigidly held. Two carbide-tipped, inserted-blade cutters are used.

In the final milling on the second Sundstrand, Fig. 3, another air clamping fixture is used. On the forward stroke of the carriage, a single end mill at one end and two end mills at the opposite end of the casting machine bosses not faced in the prior operation. When the return stroke is made, a fourth end mill, which cleared the casting on its forward stroke, is fed in from the side and faces a fourth boss before retracting.

Setups on these two Sundstrands are such that one operator tends two machines, loading one while the other is operating. In this way, one man performs both sets of operations on 450 castings in 8 hr.

Parts Drilled From Four Sides

For drilling operations, the power frame is placed in a box fixture, two of which are provided. These fixtures permit drilling from four sides and two ends. By using a battery of three Natco multiple-spindle drills, Fig. 4, a total of 50 holes are produced and two of these holes are reamed in each complete cycle of the three machines. There are two operators on the three machines. One loads the fixture and drills some of the holes and the other man completes the drilling and unloads the fixture.

In these operations, the heads of the machines remain fixed and the tables feed upward to advance the work into the tools after the fixture is placed against locating stops. As the feeds are not synchronized, the tables move up and down independently and are seldom at the same height. The fixture is rather heavy and so is slid from machine to machine.

Since table heights vary constantly, a special

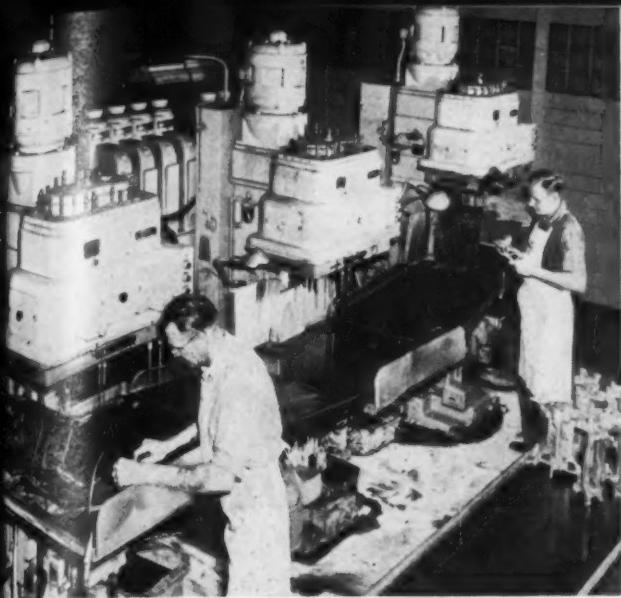


FIG. 4—These three multi-spindle drills produce 50 holes in power frames. Ramps between machines facilitate sliding fixtures from one table to the next. Ramps are free of attachment except to tables themselves, since tables are constantly changing in height.

arrangement of ramps is used between them. Each ramp is hinged to the table of one machine and its opposite end rests on a bar just below table level on the next machine. With this ar-

rangement, the ramps rock as tables move but ramp edges remain nearly flush with the tables at both ends. This arrangement makes it easy to slide the fixture, whether loaded or unloaded, from end to end of the setup regardless of table position, though, between machine tables, the sliding usually is up or down an inclined ramp.

Odd Angle Drilling Uses Fixture

Although most of the drilling is done normal to the upper face of the fixtures, a few holes are required at an odd angle and these are drilled with the fixture located against stops on an incline. This incline remains fixed with reference to the table of the machine but rises and falls with the table. The angle of the incline is not large and it is not difficult to push the fixture into position. When located there, drilling is done by feeding the table vertically upward, just as at other locations.

Setups of the type here described use, with one exception, only standard machines readily adaptable to other jobs if schedules change enough to make other setups economical. Most of the expedients employed could be used effectively in other shops where similar problems are presented.

NEW BOOKS

Old French Ironwork, The Craftsman and His Art, by E. B. Frank. The author provides a delightfully human as well as authoritative discussion of the ancient but forgotten art of ironwork—its craftsmen, tools and inventions. More than 500 objects are illustrated, including locks from the fifteenth to eighteenth centuries, padlocks and keys, hinges, bolts, escutcheons, knockers, grilles, nails, caskets, tobacco devices, knives, sewing accessories, figurines, candle sticks and statues. Harvard University Press, Cambridge, Mass. \$6.00. 222 p.

Steel Castings Handbook. The 1950 edition, completely revised, has been expanded to present up-to-the-minute information on types of steel castings, specifications, design considerations, applications, mechanical and physical properties of cast steel, and other comprehensive technical data covering virtually every facet of the industry, its products, processes, history and outlook. The book is a standard reference helpful to engineers, designers, draftsmen and others active in the metal-working field, with detailed treatment of the subject of steel casting design. Processes are detailed, and one section lists recommendations to purchasers of steel castings. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15. \$4.00. 510 p.

Sources of Economic Information for Collective Bargaining, by E. Dale. The study examines data now available to negotiators and arbitrators who are seeking a more factual approach to wage setting. It discusses in detail the sources of figures and the nature of the arguments cited by both management and unions in connection with the four criteria most commonly used in the determination of wage rates: the cost of living, productivity, "going" wage rates, and ability to pay. The study is not only a bibliography of wage data, but is also an analysis of the value and limitations of these criteria. American Management Assn., 330 W. 42nd St., New York 18. \$3.75 (AMA members, \$2.50). 172 p.

The AMA Handbook of Wage and Salary Administration, edited by M. J. Dooher and V. Marquis, is a complete guide to principles and techniques of wage and salary administration, and company experiences of all major types of job evaluation and wage administration plans. The book also contains new AMA research material on wage surveys, union contract provisions covering office salary administration, and job evaluation forms, as well as an up-to-date bibliography. American Management Assn., 330 W. 42nd St., New York 18. \$7.50. (AMA members, \$5.00). 412 p.



Voltage regulators are used by the thousands in Ford passenger cars, trucks and tractors. Quantity production of the structural stampings is obtained through use of progressive dies in high-production presses and Multislide machines.

Regulator parts mass-produced IN PROGRESSIVE DIES

By ALLEN ENSIGN

General Foreman, Parts & Equipment Mfg. Div.

Ford Motor Co., Ypsilanti, Mich.

FIG. 1—Assembled generator regulator produced by Ford Motor Co. at its Ypsilanti, Mich., plant. Major structural parts, including a cover not shown, are stampings.

Most of the structural parts of Ford generator regulators are stampings. These include a fairly heavy drawn and flanged base and a drawn and flanged cover that fits the base. Fastened to each base are three U-shaped frames in which the operating coils are installed. On these frames are mounted contact point assemblies that open and close as the regulator performs its control functions. Several other stampings go into the assembly but only the major ones above mentioned are dealt with here. An assembly minus its cover is shown in Fig. 1.

In finished dimensions, the base stamping approximates $4\frac{1}{2} \times 5$ in. and is about $\frac{3}{4}$ in. deep. Production is from 0.051-in. strip stock. The draw includes a bead around the contour of the portion on which other components are mounted, together with the flange, that remains in the plane of the blank. This makes a rigid part not likely to be distorted by tightening of mounting screws when the regulator is installed.

This is important because significant distortion may cause improper functioning of the regulator. Mounting screws pass through three rubber shock insulating gromets that provide a three-point mounting. Besides stiffening the stamping, the bead forms a rigid seat for the gasket that fits between the cover flange and the base and provides a water and dust seal.

Coil stock employed for the base is 5 in. wide and is run through flattening and feed rolls on its way into the die, Fig. 2. This die is a progressive type and is used in a Brandes press that resembles other dieing machines of the

type whose head is moved by tie bars from a cam below the baseplate of the machine. This type of press, though producing a rather heavy stamping, makes 40 working strokes a minute and, because of the progressive die employed, yields a completed stamping at each stroke.

There are five stations in the die and the stamping is advanced from station to station by the ribbon of metal left at the two edges of the strip. Blanking is done at the first station and results in piercing out metal adjacent to the end of what becomes the drawn portion, so that the metal can draw in and still leave the strip flat except where the draw is made.

Redraw Produces Bead

This draw is to full depth at the second station but redrawing is done to produce the bead and give the body its final shape at the third station. Actually, the bottom or mounting surface is elevated as the piece is bottom up at the time in relation to the position shown in Fig. 1. At the fourth station, four holes through the flanges and nine through the mounting area are pierced. A name stamp marks the longer flange at this same station.

It remains to blank the contour and sever the piece from the strip at the fifth station. This drops the stamping through the die, leaving the waste ribbons to be sheared off at the next stroke. This does not quite finish the stamping because it is necessary to pierce out three side holes through which terminals project below the mounting level when the assembly of parts to the base is effected. These holes are pierced in a horn die. The slugs have to be pushed

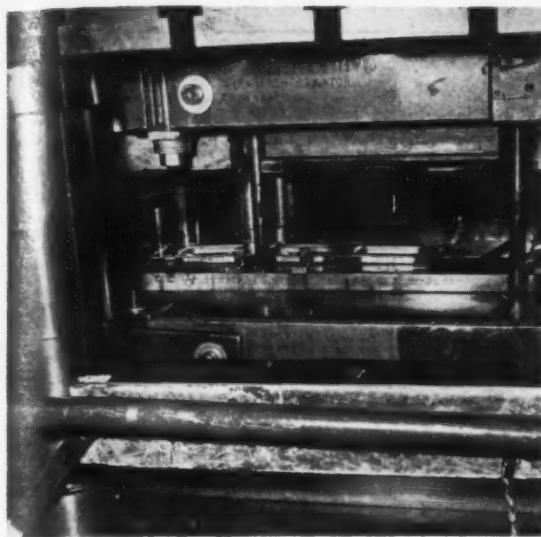


FIG. 2—Setup of the progressive die for producing the base stamping in a Brandes dieing press. The head is reciprocated by sliding tie bars from a cam in the base of the machine.

outward by overhung punches because the top edges of the holes are above the level of the mounting base and the ends of the punches enter the recess under the bead.

Somewhat more conventional is the cover stamping shown on an incomplete strip from the progressive die in Fig. 3. It is merely an oblong box with its open end flanged for a gasket clamped between the cover and the base in the final assembly of the regulator. Half of the die that produces this stamping is shown in Fig. 4. This die is used in the same press that makes the base stamping, but has six sta-

tions. Coil stock $8\frac{1}{2}$ in. wide and 0.036 in. thick is employed and is advanced through flattening and feed rolls.

Blanking is done at the first station, right in Fig. 4, where four holes are pierced but the blank remains attached to the strip. The holes permit the metal to be drawn in at all four sides in the first draw operation, at the second station, and still leave the remainder of the strip flat and continuous to advance the workpieces through the die. Redrawing is done at the third station and, at the fourth, marking dies produce letters on the top and punches pierce flange holes for fastening rivets. At the same time, a narrow return flange is produced at the periphery of the gasket flange.

Last Dies Trim and Cut

At the fifth station, the flange is trimmed and at the sixth and final station the finished workpiece is cut from the strip and is pushed down through the die.

Production of the U-shaped frames is done in a U. S. Multislide machine, Fig. 5. Strip stock, 0.75 in. wide and 0.090 in. thick, is fed in a vertical plane as the slides operate horizontally. At the first station, a large notch is cut and three projections for subsequent location at assembly to the base stamping are produced. Piercing of two holes and the embossing of a depression at the narrow neck above the notch are accomplished at the second station.

Cutoff occurs at the third station after the piece is advanced against the vertical form around which the piece is bent to final shape. This final forming follows immediately, being done by the remaining slides which produce three right angle bends and give the prong the

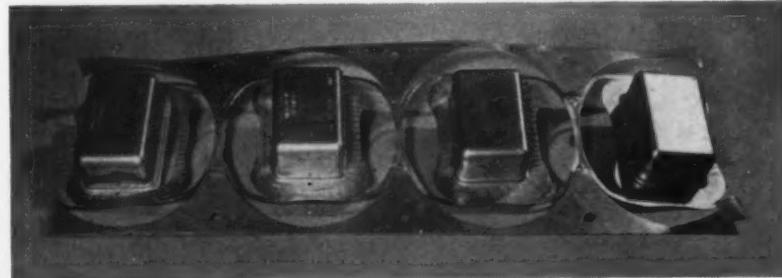
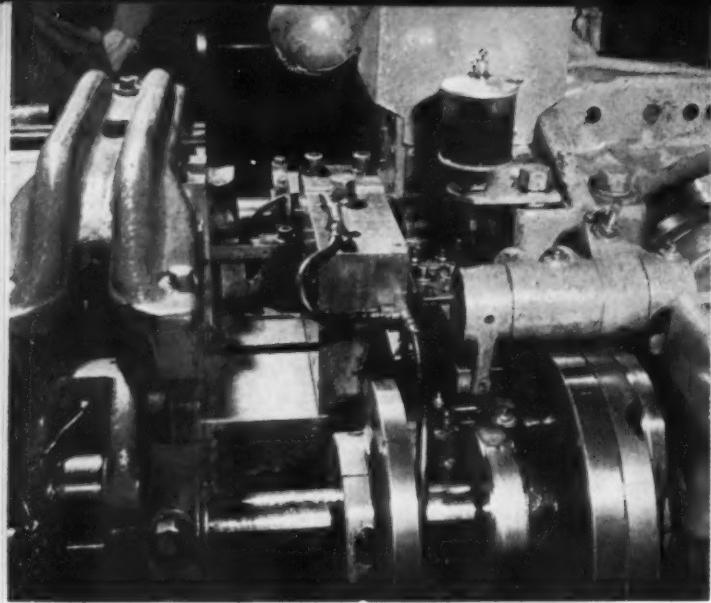


FIG. 3—Portion of a strip from the progressive die which produces regulator covers complete.



FIG. 4—Upper half of the progressive die for cover production. Only a part of the blanking station shows at extreme right.



Mass-production in progressive dies

Continued

specified curved shape. Production in this machine averages above 2800 pieces an hour. The same general type of pieces but having slight differences in shape are produced in similar setups in the same machine, using slightly altered dies in some positions.

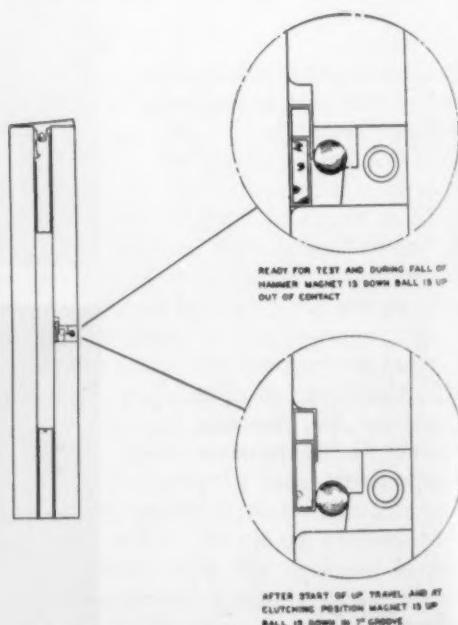
FIG. 5—Setup in a Multislide machine for producing U-shaped stampings. The strip moves from left to right in a vertical plane, as die motions are horizontal.

Low-cost hardness tester is rugged

For the purpose of quality control in the industries involving the use or manufacture of metal products, a hardness tester which will meet the following requirements is highly desirable: (1) low initial and maintenance costs; (2) simple construction and operation; (3) durable construction; (4) portability; (5) versatility of use, permitting tests in many locations; (6) reproducibility of results under identical conditions.

Low initial cost permits more instruments to be purchased and made available for a given monetary appropriation. This permits a wider use of the instruments by men other than a very few designated inspectors and results in a closer check on the desired quality.

PHOTOGRAPH and construction details of the AH hardness tester. Insets show action of clutching mechanism during operation.



news of industry

Scrap Shortage Threatens to Slow Steel Output

Signs point to repetition of World War II shortage . . . Electric furnace steel output already affected and openhearth curtailments are threatened—By Bill Lloyd.

Cleveland—Big question in major steelmaking centers across the nation this week is, where's the scrap?

During the past month tonnage has disappeared from the open market like a snowball in the proverbial hot spot and the growing possibility a scrap shortage rivaling or exceeding that of World War II has consumers and the trade babbling.

The threatened shortage could put this nation in the somewhat ridiculous position of reducing the level of operations of existing steelmaking capacity while millions of tons of new steel capacity are under construction.

Some Shortage Reasons

Explanations of the present shortage, which is featuring rapid increase in the number of allocations and an equally rapid disappearance of inventory among consumers, are numerous and necessarily vague. A combination of bad weather, rail strikes, car shortages and the schedule itself provides the best answer.

Of some significance is the fact that dealers and brokers cleaned up the available tonnage pretty completely during the \$55 spurt in the market just prior to the announcement of the regulation.

Since then, weather has limited collections and preparations of the tonnage that has moved into the

yards, but in any event, the amount has not been big enough to sustain steelmaking at capacity.

Some steel mill tonnage has already been lost as a result. One consumer of electric furnace grades has had two or three electrics off and on for the better part of the past month. Should history repeat itself, and the industry have 1941 all over again, some openhearth tonnage is going to be lost.

No Relief Sighted

Various solutions have been advanced by buyers, brokers and other interested parties, ranging from slapping an embargo on the Chicago district, which is supposed to be the best fixed inventory-wise, stopping all conversion operations, to reducing steelmaking operations 5 pct.

In Washington, Marvin S. Plant, chief, scrap section, Iron and Steel Div., told THE IRON AGE that he did not expect the situation to straighten out in the near future.

"We have plans to bring more scrap into the market, but none of them are at the point where we can discuss them publicly," he said.

"We have high hopes that dealer scrap will come through, as better weather permits an improvement in collections. Right now, we are moving to stop cross hauling."

Asked what will happen if scrap

Turn Page

Chilled--But Not Killed

Boston — Hopes for a New England steel mill have not been extinguished, but they have been dimmed.

Backers of the proposed million ton, \$250 million plant near New London, Conn., have suffered a double setback. They have run into unexpectedly stiff opposition in the Connecticut legislature to the bill which would establish eminent domain as a means of acquiring needed property speedily. Also, the engineering study by Coverdale & Colpitts was disappointing.

The engineering study, which was recalled before its release date in order to add later important information, was not openly unfavorable. But it was lacking in positive recommendations which were expected to put more push into the project.

As things stand now, the feasibility of the mill might become academic, in view of the opposition from strong-minded property owners. They insist that a steel mill is a private project and property should be acquired by private means. Those pressing for eminent domain say there isn't time—claiming that the certificate of necessity would expire before the land could be obtained.

The eminent domain bill is now in committee and will probably be held up until the revised report by Coverdale & Colpitts is ready. It is believed that a highly favorable report will be required to make the legislators act favorably. In spite of the fact that sentiment generally favors the mill, eminent domain is strictly a hot potato here.

INDUSTRIAL SHORTS

Incorporated — Richard-Allen Corp., College Point, N. Y., manufacturers of low voltage selenium rectifiers for the plating industry and high voltage rectifiers for other industrial uses, as well as battery chargers and other electrical equipment, have incorporated the RICHARDSON-ALLEN OF CANADA, LTD., a company under Dominion charter, to manufacture their complete line for that expanding market.

New Firm — A new development and manufacturing corporation specializing in valve assemblies has been established under the name, MISSILE VALVE CO., Los Angeles. The company offers immediate service on special design and production of such items as pressure regulators, relief valves, shut-off valves or check valves.

Plant Expansion — A new expansion program at the St. Louis plant of JOSEPH T. RYERSON & SON, INC., includes reconstruction and new layout of their present plant, and construction of additional warehouse space totaling 50,000 sq ft. Construction has started and is expected to be completed by the end of the year.

Allis-Chalmers Dealer — Allis-Chalmers Mfg. Co. has named the PETRO-CHEMICAL EQUIPMENT CO., INC., Houston, a dealer in a portion of Texas for their motors, controls, blowers, compressors and Tex-rope drive equipment.

Dayton Warehouse — A. MILNE & CO., tool and specialty steel distributors, New York, have opened a new tool steel warehouse in Dayton. The steels available from Milne at Dayton will include hollow and solid tool steels, in standard oil hardening, air hardening and water hardening grades, also hot work and shock resisting tool steels.

DeWalt On Film — A new color motion picture with sound has been produced by DEWALT INC., Lancaster, Pa., manufacturers of cutting machines for the woodworking, metal and plastics industries. The new film shows the many applications of the latest line of DeWalt machines, the DeWalt Models '400', and is available for free distribution through representatives of the company located throughout the country.

Employee Trust Fund — Two trust funds have been established by WESTINGHOUSE ELECTRIC CORP., Pittsburgh, to administer contributions to the employee pension program that became effective Jan. 1. The Chase National Bank of New York and the Mellon National Bank & Trust Co., Pittsburgh, will be trustees of the fund. It is stated that about 3500 former Westinghouse workers are now receiving pensions. Eventual total of the two trust funds may exceed \$300 million.

Defense Contract — The DELTA TANK MFG. CO., INC., of Baton Rouge, La., and Macon, Ga., has been awarded a defense contract in the amount of \$7,900,000. The production of heavy artillery ammunition will not get underway for several months. The company has just completed construction on a new building, covering 53,000 sq ft, to house the project.

Purchased Plant — The 230,000 sq ft LaPorte, Ind., plant of LaPorte Corp., has been purchased by the WHIRLPOOL CORP., St. Joseph, Mich., manufacturers of home laundry equipment. Whirlpool plans to use the plant for production of war equipment.

Office Closed — The Broadway offices of BALDWIN-LIMA-HAMILTON CORP., New York, were closed recently. All sales activities in the New York area will be coordinated in the company's offices at 60 E. 42nd Street, New York.

supply reaches a point where operations will have to be reduced. Mr. Plant said that if steelmaking operations are reduced, they will be reduced equitably. One mill will not be working 100 pct and another 75 pct. The reduction will be equitable throughout the steel industry.

"We are trying to equalize what we have to work with, right now," he pointed out.

Meanwhile, over-grading and some of the other marginal practices reminiscent of OPA are growing. Brokers are complaining that mills are getting unprepared tonnage direct from industrial plants and railroads, a practice which they feel curtails their functions even further.

The price is more than double the OPA level. As good an answer as any might be a big scrapping program in industrial plants, government arsenals and installations, ships, chemical plants and refineries which would yield a lot of tonnage, according to wrecking experts.

Scrap has become a highly strategic commodity. With next year's requirements estimated at 6 million tons higher than 1950 consumption, scrap rather than steel capacity may well become the controlling factor in steel production.

Build New Ore Handling System

Pittsburgh — Rust Engineering Co. has been awarded the contract for construction of a new bulk-handling conveyor system for ore handling at the Alabama State Docks and Terminals in Mobile. Cost will be \$750,000. The new facilities will tie into existing conveying equipment installed by Rust in 1939.

Correction on Ferroalloy Plant

Canton, Ohio — A plant to produce ferroalloys for steel plants and iron foundries will be built at Brilliant, Ohio, by the Ohio Ferro-Alloys Corp., this city. In a previous news story (THE IRON AGE, Mar. 1, 1951, p. 122) "Ohio" had been omitted from the firm's name.

Shipyards Stir as Defense Spending Mounts

"Atomic-age" Navy, fast new merchant ships, ECA withdrawals from reserve fleet give yards work . . . Labor needs may prove problem . . . Big aid to private builders—By Bill Olson.

New York—Shipbuilding, the boom-bust-boom-bust industry, is once again stirring under the impetus of defense spending.

Recent government actions include: (1) Final passage this week of the \$2 billion "atomic-age" Navy program; (2) a previous naval program of \$335 million; (3) appropriation of \$350 million to build 50 new fast cargo ships; (4) deposit this week of \$20 million of a \$56 million ECA loan program to get 100 Liberty ships out of mothballs.

Biggest problem facing the industry will be labor. Employment in January 1947 totaled 250,000 for both private and Navy yards. Employment dropped steadily to 132,000 in May of 1950.

Since then employment has been rising slowly, with more and more men going to Navy yards. In early 1950 private yards employed 161,000 against 89,000 in Navy yards. In October 1950 Navy yards employed 81,000 against 74,000 in private yards.

Without defense spending, builders would face lean years. "Half price" competition of foreign yards poses a big problem for American shipbuilders.

Foreign Competition

Foreign yards are in the chips. With low labor costs they can build the same ship for 40 to 50 pct of the cost in American yards. Chief competition comes from Britain, Sweden, Norway, Japan and Italy. German yards are also re-awakening. The West German merchant fleet doubled during 1950 and is expected to reach 1 million tons soon.

Alcoa is building two big ore carriers in Britain. British bid was \$1,720,000 against the lowest American bid of \$3,494,000. One of the first giant carriers to move foreign ore to the U. S. will also

come from British shipyards. Many ships are being built in foreign yards for Panamanian flag operations in which U. S. owners hold a controlling interest.

Lloyd's 1950 report of launchings shows 3,492,876 tons floated during the year. Of this, the U. S. is credited with 437,031 tons, a drop of 196,275 tons from 1949 launchings.

Need for Merchant Marine

Shipbuilders are sharply aware of the need for an American merchant marine adequate for national defense and concerned with failure of Congress to develop a long-range shipbuilding program.

President Truman recently cleared the road for establishment of a National Shipping Au-

thority to operate the U. S. merchant marine during a national emergency. The Authority, under Secretary of Defense Charles Sawyer, would represent the United States in war shipping pool agreements with other nations. One duty will be operation of a fleet of ships withdrawn from reserve fleets for the ECA.

In the reserve fleet at present are about 2100 vessels, of which more than 1500 are Liberty ships. Close to 5000 merchant ships were turned out by U. S. yards between 1942 and 1945. From 1946 through 1950 private yards built 204 merchant ships.

Fewer passenger ships are running as airlines cut into over-ocean passenger revenues. In 1941 this country had 113 ships capable of moving 40,000 persons. Today there are about 53 ships with accommodations for 15,000. In 1949 half of all trans-Atlantic travel was by airline and estimates are that within the next decade only a quarter of trans-Atlantic travel will be by boat.

DO's Slow in Creeping into Metal Stamping

Midwest metal stampers DO average is from 5 to 10 pct . . . Civilian orders high, but cutbacks coming . . . Some firms want to enter defense gradually—By Gene Beaudet.

Chicago—Defense orders are gradually seeping into midwestern metal stamping operations but the production picture still remains predominantly civilian. DO orders in this field range from 2 to 30 pct but the average probably is somewhere between 5 and 10 pct. Radio, television, and appliance makers are now placing a high volume of orders but this should taper down with cutbacks on the way in the next 2 or 3 months.

Just how quickly various companies are entering defense work depends on their equipment and the type of product they make. Those making washers are putting a lot into the freight car and tank programs while others making small tools have hardly en-

tered the defense work scene at all.

Some companies find products such as parts for regulating controls and oil sealers are becoming classified and defense business is coming to them without having to look for it.

Seek Gradual Buildup

A lot of firms would prefer to wait for their regular customers to get prime contracts before they go into subcontract work. Thus they hope to maintain their normal contacts rather than look for new ones which will drop them when the pressure eases. Others are shying away from those subcontracts which will take their entire production capacity.

They would like to build up gradually with the defense effort.

Just what their reaction to defense work depends on the material supply. Those cut short of materials are trying to get all the DO's they can lay their hands on.

Materials are still the big problem. Conversion and premium priced steels are still a major source for many, although some firms are steering clear of 22¢ per lb cold-rolled sheet which takes the profit out of some jobs. The most fortunate stampers are those whose customers supply them with the steel to make their stampings.

Charges Wage Freeze Leads To Labor Pirating of Tool, Die Men

New York — The manpower crisis of the 2500 tool and die shops in this country is worsening because of labor pirating and armed forces induction policies, George S. Eaton, executive secretary of the National Tool and Die Manufacturers Assn., told the Senate Special Committee on Small Business on Manpower.

Recent wage regulations freezing tool and die wage scales below those of competitors and mass output industries have led to increased labor pirating and many shops are being stripped of their best men, charged Mr. Eaton. He also urged more lenient draft exemption policies for tool and die men who are "the core of mass production of war weapons."

New Building for Caterpillar

Peoria, Ill.—Construction of a new building for Caterpillar Tractor Co. will begin in the near future with completion expected in early 1952. It will be used chiefly for storage and repair of heavy dies and fixtures.

Steep Rock Net Income Rises

Steep Rock Lake, Ont.—Net earnings of Steep Rock Iron Mines, Ltd., was \$2,547,765 for 1950, a jump from 1949's \$1,477,273. Last year the firm's Errington open pit mine shipped 1,216,614 tons of iron ore.

As part of a group of five steel

and mining companies headed by Pickands, Mather & Co., Steep Rock is opening up one of a number of areas that remain to be developed on its range. Along the lines of an agreement made with Inland Steel Co. in 1949, the new agreement provides for intensive

exploration over a short time, followed by immediate development on a royalty basis on a scale consistent with reserves disclosed by exploration.

Steep Rock itself is opening two other mines for initial production in 1953.

Refractories Adjust Pace to Expanding Steel

Some see refractories industry spending \$100 million for expansion in '51 . . . Supplies are now tight but no one suffers . . . General Refractories to expand—By John Delaney.

Pittsburgh — The refractories industry, now straining to meet demand from steel and other industries, has embarked upon an expansion program designed to keep pace with its customers.

Some authorities estimate that the industry will spend something like \$100 million this year on expansion.

Meanwhile, refractories supplies are tight. The industry itself admits this, but it is also quick to point out that no one is suffering for lack of refractories. As the expansion program takes hold, the industry is confident there will be enough to go around. Extent of U. S. interest in refractories expansion is evidenced by the 100 pct record on which applications for certificates of necessity were approved for the field.

Grimmer Market Picture

In the interim, however, some steel men fear that the demand-supply picture will become grimmer. Deliveries are considerably extended, and a great deal of improvisation is going on to handle emergency situations.

The industry's eagerness to meet emergency spot demand is best illustrated by a recent occurrence. A steel producer found himself in a desperate plight when a blast furnace broke out unexpectedly, necessitating a shutdown for relining. Three refractories producers offered to meet the emergency. The bid of one was accepted, and the mill now

hopes to complete the relining job in less than 40 days.

The refractories industry is high on the government's essential list because of its importance to steel production and to other industries it serves, including public utilities, chemicals, nonferrous metals, glass, oil, ceramics, and cement and lime. A representative of the industry is attached to the Steel Section, Dept. of Commerce.

Get Fast Tax Writeoffs

Certificates of necessity totaling nearly \$40 million have been issued to cover part of the expansion plan of ten companies: Harbison Walker, \$20,028,605; General Refractories, \$8,413,653; Mexico Refractories, \$1,409,950; Northwest Magnesite Co., \$5,786,979; The Dolite Co., \$837,404; A. P. Green Fire Brick Co., \$701,494; Walsh Refractories Corp., \$335,850; North American Refractories Co., \$281,024; The Ironton Fire Brick Co., \$170,000; Big Savage Refractories Corp., \$581,762.

Harbison-Walker, for example, is building a plant at Windham, Ohio; a manufacturing unit at Fairfield, Ala.; an additional continuous tunnel kiln, and kiln and storage buildings at East Chicago, Ind.; an additional kiln and manufacturing units at Bessemer, Ala.; Fulton, Mo.; Baltimore, Md., and Cape May, N. J. It is also expanding facilities at its Kilmar, Quebec, plant.

General Refractories Co. will

spend \$12 million in 1951, of which more than \$3 million will be used for expansion of the Baltimore Works and construction of a new plant at Los Angeles. The balance will be used chiefly for expansion of silica brick manufacturing facilities.

These programs are typical of what is going on in the rest of the industry.

The industry is quite active on the research front. Harbison-Walker, for instance, has developed super-duty silica refractories, special fireclay and super-duty fireclay blast furnace refractories, and special refractories for the glass, cement, and nonferrous industries.

Chief concern of the industry today is manpower. Even with a high priority rating, a manpower problem is anticipated, and it may be necessary to hire large numbers of women workers, as in World War II.

Steel Needs Huge

An idea of the magnitude of the industry's job in keeping pace with expansion in steel may be seen in these figures: A large modern blast furnace will require refractories equivalent to more than 1 million building bricks; a 120-ton openhearth furnace approximately the same; 200 coke ovens require the equivalent of building brick for 1150 six-room houses. Refractories are essential in approximately 150 different types of industrial furnaces, many of them important to steel production.

Defense, Related Needs Will Take 700,000 Tons Plate Monthly

Washington—Steel plate for defense and related special programs will total 700,000 tons a month, the National Production Authority estimates. The agency is urging additional plate production from strip sheet mills.

To improve the supply situation, NPA urges purchasers of plate from strip mills to:

Accumulate small quantity orders into groups of not less than

10 tons of size and grade; waive standard tolerances where strip mills are not able to meet established plate shearing and camber tolerances; modify plate specifications where strip mills cannot meet transverse test requirements (most can't); and, temporarily suspend the practice of ordering stock material in sizes larger than needed (to be cut as wanted) and place more orders to come within strip mill sizes.

Meeting with NPA last week, the Steel Plate Industry Advisory Committee has recommended that government agencies get together and work out standardization of plate gages as quickly as possible.

Link-Belt Plans Foreign Expansion

Chicago—Link-Belt Co. is planning expansion in the U. S. and has purchased land near Toronto for enlargement of its Canadian facilities. It also plans a new plant in South Africa. Two new laboratories in Indianapolis and this city are being established.

Link-Belt's 1950 net income was \$8,586,675, as compared to \$7,976,597 in 1949. Sales last year totaled \$83,176,875.

Electrification Forum Apr. 10-11

Pittsburgh—The 1951 Machine Tool Electrification Forum sponsored by Westinghouse Electric Corp. will be held at the William Penn Hotel, Apr. 10 and 11. J. J. Smith, Jr., of Westinghouse, will be general chairman of the forum.



BITS AND BRIEFS

By Bill Packard

"Damned if I know what they (labor leaders) want," commented defense mobilizer Wilson after conferring with the vacationing President over labor chiefs' "take-a-walk" tactics in their battle for power. Mr. Wilson isn't anti-labor, but he is proud and determined to succeed in his present job. Meanwhile the snipers are at work suggesting that he has political ambitions . . . U. S. Steel's all-rail shipment of iron ore from Minnesota has been termed a costly success. About 2 million tons were shipped by rail to ease the expected ore pinch this spring . . . Rheem Mfg. Co. has letters of intent for \$10.3 million of mortar shells. Rheem President C. V. Coons says he'll need 575 more workers in Houston area and \$2.6 million new machine tools in addition to those furnished by Ordnance from reserves . . . New England Council repeats persistent rumor Maine is being considered as aluminum plant site with Passamaquoddy power being discounted in favor of Penobscot River development . . . The governor of Hong Kong reports the British Colony handled a record \$1.3 billion of foreign trade last year but prospects for this year don't look promising. Any GI fighting the Reds in Korea would be glad to punch his T. S. card for him . . . New President Avery C. Adams is getting a lot of credit for Pittsburgh Steel's strong comeback in earnings . . . Jersey Joe just missed again, but he sure gets "A" for effort in our book . . . Vanadium Corp. of America will more than double production of chrome ore by purchase of mining properties in Southern Rhodesia. President W. C. Keeley says Vanadium has signed an agreement with Societe d'Electro-Chimie of France for use of their process for making very low carbon ferrochrome . . . At recent dirt turning of U. S. Steel Fairless Works were several heads of

companies who might build plants nearby. Some of these customers were pointing out their lots like prospective home owners . . . Westinghouse to build a small motors plant at Union City, Ind., and an electronic tube plant at Horseheads, N. Y., near Elmira. President Gwilym Price says they are planning 100 pct expansion of electric consumer goods capacity.

Chile Offers Copper Output Rise

New York—Chile has offered to increase production of copper from 350,000 annual tons to 500,000 with U. S. help in providing needed machinery. A price increase to about 27¢ a lb was also suggested. To help Chile in getting imports of foodstuffs, the country asked for authority to export between 20,000 to 40,000 tons to consumers other than the U. S. but not to Russia.

Washington Odds in Favor of Open-End CMP

Open-end plan would be easier to decontrol, its backers say . . . NPA debate on now, decision coming . . . Open-end CMP would take military share, leave balance for civilian scramble.

Pittsburgh—The National Production Authority will institute a Controlled Materials Plan covering steel, aluminum, and copper July 1. Still being debated, however, is whether the plan will be open-end or complete. A decision on this point will be reached within the next week.

The odds are in favor of an open-end program. At least that is the impression of steel people close to Washington developments. Those in favor of an open-end program reason that if international tension slackens it would be easier to decontrol.

Under an open-end program, NPA presumably would decide how much of these metals would be needed for military and other essential uses, with the remainder left "free" for non-essential consumers to scramble for.

DO and Program Tonnage

Indications are the government is now trying to determine the impact of DO and program tonnage on the available supply. Steel producers have been instructed by NPA to wire immediately as each month's DO booking is completed, by products. This tonnage, combined with program tonnages, would provide the answer on how deep a bite essential needs are taking.

It is also understood NPA is considering giving DO status to essential programs, such as freight cars, Great Lakes carriers, oil country goods, etc., effective with start of the CMP program. Essential programs are now booked through May.

Further details on how the open-end CMP would work are lacking. NPA officials have been vague in responding to direct inquiries, indicating details are still being worked out.

If such a program is to be instituted, however, the answer must be forthcoming soon. While the lead time on some steel products is only 45 days, the production cycle on others, such as cold-finished bars, is 75 days.

Dravo to Install J&L Pumps

Pittsburgh — The Dravo Corp. Machinery Div. will install three large pumps with total capacity of 63,000 gal of water per minute for the new 11-furnace open-hearth plant at the Jones & Laughlin Steel Corp. Pittsburgh works.

January Iron & Steel Production by Districts

As Reported to American Iron & Steel Institute

BLAST FURNACE CAPACITY AND PRODUCTION NET TONS	Number of Companies	PRODUCTION							
		PIG IRON		FERRO- MANGANESE AND SPIEGEL		TOTAL		Per cent of Capacity	
		Annual Blast Furnace Capacity	Jan.	Year to Date	Jan.	Year to Date	Jan.	Year to Date	Jan.
Distribution by Districts:									
Eastern	12	13,870,880	1,170,028		27,222		1,197,250		101.6
Pitts.-Youngtn.	17	27,070,520	2,198,759		24,672		2,223,431		96.7
Cleve.-Detroit	6	7,110,600	582,035				582,035		98.3
Chicago	7	15,684,040	1,191,560				1,191,560		89.4
Southern	9	5,310,740	441,468		13,415		454,883		100.8
Western	4	3,425,200	245,244				245,244		84.3
Total	38	72,471,780	5,829,094		65,309		5,894,403		95.7

STEEL CAPACITY AND PRODUCTION —NET TONS	Number of Companies	PRODUCTION						Alloy Steel* (Incl. under total steel)*	Carbon Ingots—Hot Topped (Incl. under total steel)		
		TOTAL STEEL			Pet of Capacity						
		Annual Steel Capacity	Jan.	Year to Date	Jan.	Year to Date	Jan.	Year to Date			
Distribution by Districts:											
Eastern.....	25	20,823,230	1,738,588		98.3		133,037		311,971		
Pitts.—Youngstn.	34	41,411,670	3,472,710		98.7		491,020		387,512		
Cleve.—Detroit	8	9,601,940	837,023		102.6		56,873		111,503		
Chicago.....	15	21,576,750	1,861,276		101.5		143,679		271,055		
Southern.....	9	4,859,340	425,577		103.1		3,949		4,027		
Western.....	11	5,956,520	507,993		100.4		8,658		30,954		
Total.....	81	104,229,650	8,843,167		99.9		837,216		1,117,022		

* For the purpose of this report, alloy steel includes stainless and any other steel containing one or more of the following elements in the designated amounts: Manganese in excess of 1.85%, and Silicon in excess of 0.80%, and Copper in excess of 0.80%. It also includes steel containing the following elements in any amount specified or known to have been added to obtain a desired alloying effect: Aluminum, Chromium, Cobalt, Columbium, Molybdenum, Nickel, Titanium, Tungsten, Vanadium, Zirconium, and other aluminum elements.

WSB Outlines Four Rules For Retroactive Wage Increases

Washington — Wage increases authorized by the Wage Stabilization Board's 10 pct formula may be retroactive under four conditions outlined by WSB:

(1) Where the increase follows expiration of a prior contract, it may be retroactive to date of expiration.

(2) Where the increase is negotiated under a reopening clause of an existing contract, it may be made retroactive to the date of expiration.

(3) Under first contract, the increase may be retroactive to the beginning of negotiation, or the date on which the union was certified as bargaining agent.

(4) Where no bargaining agent has been certified, the increase may be retroactive to the beginning of the payroll period in which the increase was decided upon.

End Use of Metals Exports Must Line Up with Home Policy

Washington — The Commerce Dept. is moving to offset mounting criticism of permitting exports of materials which are in short supply in this country. (THE IRON AGE, Feb. 15, 1951, p. 112.)

The department's Office of International Trade now requires that the intended end use of proposed exports of such materials as copper, aluminum, brass and bronze, zinc and various other metals, ores and alloys must be stated in the license application. Proposed end use must generally be in line with whatever uses NPA permits for domestic industries.

Proof of Availability

In addition, the OIT requires proof that the material proposed for export actually is available to the applicant for an export license. Strict limitations have been imposed on the amounts of each of these strategic materials which may be shipped out of the country, officials say.

First quarter quota for copper



DRIVEN IN: Heavy wooden piles are being driven in at foundation construction for enlargement of the sheet and tin mill of Columbia Steel Co.'s plant at Pittsburg, Calif. The site shown is for the new 4-stand cold-reduction mill and a building. The piles are surrounded by rockfall for additional support.

exports was 30,000 short tons, all of which was allocated by the first week of March. A breakdown shows that the allocations were for 20,000 tons of refinery shapes, 7000 tons of general products, and 3000 tons of scrap.

Virtually all of the shapes and products licensed for the quarter are made from imported ores, most of which would otherwise have been refined abroad, OIT said. This was estimated to equal about one-fifth of total United States copper imports for the quarter.

Likewise, the entire first quarter export quota for aluminum amounting to 3500 tons, has also been allocated.

Cooper-Bessemer Expands

Mt. Vernon, Ohio—Expansion plans involving \$3 million, in addition to \$2 million previously appropriated, have been approved by directors of Cooper-Bessemer Corp. Net earnings for 1950 were \$2,639,930.

Large Rail Order Announced

Birmingham — The Atlantic Coast Line R.R. Co. has placed an order for 38,000 tons of steel rails with the Ensley mill of Tennessee Coal, Iron & R.R. Co. Estimated value, including track accessories, will be in excess of \$2,660,000.

NPA Curbs Use of Bismuth

Washington — Government control of bismuth will start Apr. 1. NPA order M-48 limits use of bismuth metal or alloys to essential rearmament purposes after Mar. 31. Heavy demands for retooling have reduced inventories.

Firms using bismuth may sell any product or complete any process requiring use of bismuth if work was begun on or before Apr. 1 and is completed before Apr. 30.

Producers must accept rated orders for shipment in any month up to 50 pct of scheduled production. Dealers must accept rated orders up to 25 pct of the amount available.

A reserve, to be drawn from only with NPA authority, is established. Producers and importers are required to set aside 20 pct of their supply each month.

AEC Spurs Zirconium Output

Washington — Wider industry participation in manufacture of high-purity zirconium for the nuclear reactor development program is being encouraged by the Atomic Energy Commission.

Under the AEC zirconium purchase program information on processes developed by the Bureau of Mines and AEC contractors will be made available to private producers.

CONTROLS DIGEST

Defense Contracts to Metalworking Industry

Selected Contracts, Week of Mar. 12, 1951

Item	Quan.	Value	Company	
Repair parts	12,561	134,438	Bendix Aviation Corp., N. Hollywood, Calif.	
Repair parts	90,450	326,503	General Electric Co., Philadelphia	
Various Repairs	20,065	584,111	Buffalo Pumps, Inc., Buffalo	
Temperature regulators	7,317	178,428	Robertshaw-Fulton Controls Co., Knoxville	
Indicators	Compass	1,147	1,577,461	General Electric Co., Philadelphia
Pump parts	50	84,919	Bendix Aviation Corp., South Bend	
Doughnut machine	75	149,263	Doughnut Corp. of America, New York	
Burners	25,000	169,960	Lonergan Mfg. Co., Albion, Mich.	
Dump trucks		3,730,508	Reo Motors Corp., Lansing	
Trucks	3,984	14,770,000	Reo Motors Corp., Lansing	
Bus	1,656	19,617,000	Twin Coach Co., Kent, Ohio	
Bus	435	5,750,265	ACF Brill Mtrs. Co., Philadelphia	
Bus		11,554,200	GMC Truck & Coach Div., Pontiac, Mich.	
Automobile		845,695	Chevrolet Motor Div., Detroit	
Switch instrument	200,000	518,000	The Zaiger Corp., Lynn, Mass.	
Starter shaft	13,850	143,666	United Motors Service Div. G.M.C., Detroit	
Sedan automobile	92	118,177	Ford Motor Co., Washington, D. C.	
Gage, conduit		648,719	Food Machinery & Chemical Corp., San Jose, Calif.	
Kit, shaft	20,240	116,450	Bendix Aviation, South Bend	
Magneto	1,520	102,448	American Bosch Corp., Springfield, Mass.	
Control, generator	940	77,430	Graybar Electric, Detroit	
Thermometers	13,088	104,973	American Machine & Metals, Inc., New York	
Repair parts	18,467	175,563	General Electric Co., Philadelphia	
Machine, peeling	500	124,901	Gifford-Wood Co., Hudson, N. Y.	
Distillation unit	50	487,465	Cleaver Brooks Co., Milwaukee	
Interphone	2,500	134,000	Alliance Mfg. Co., Alliance, Ohio	
Interphone	4,140	222,000	Electro Industries Corp., New York, N. Y.	
Interphone	1,028	55,000	Automatic Radio Mfg. Co., New York	
Telephone terminal		120,000	Western Electric Co., New York	
Signal generator	200	80,000	Waterman Products Co., Philadelphia	
Radio sets	1,747	400,000	Hoffman Radio Corp., Los Angeles	
Radio transmitter	126	200,000	Transmitter Equipment Mfg. Co., New York	
Radio set	130	200,000	Hallicrafters Co., Chicago	
Radio set	197	400,000	The Hallicrafters Co., Chicago	
Radio set	1,917	750,000	Collins Radio Corp., Cedar Rapids, Iowa	
Radio	370	400,000	Kapey Mfg. Co., New York	
Control	7,077	200,000	Gray Mfg. Co., Hartford, Conn.	
Radio	66	400,000	The Hallicrafters Co., Chicago	
Power Supply	3,500	150,000	American Television, St. Paul, Minn.	
Power Unit	5,571	475,000	Jacobson Mfg. Co., Racine, Wis.	
Power Unit	3,966	500,000	Kehler Co., Kohler, Wis.	
Power Unit	1,560	235,000	Universal Motor Co., Cahkosh, Wis.	
Power Unit	1,077	160,000	United States Motors Corp., Cahkosh, Wis.	
Truck	314	600,000	J. M. Holden Corp., Cleveland	
Truck		800,000	McCabe Powers Auto., St. Louis	
Pump	88	350,000	De Laval Steam Turbine Co., Trenton, N. J.	
Oscilloscope	350	200,000	Allen B. Dumont Laboratories, Clifton, N. J.	
Washing machines	194	177,806	American Laundry Machinery Co., Cincinnati	
Pumps	40	197,552	Buffalo Pumps, Inc., Buffalo	
Indicators	1,147	1,577,461	General Electric Co., Philadelphia	
Generators	30	184,350	Consolidated Diesel Electric Corp., Stamford, Conn.	
Air guns, parts	77	1,848,000	Garrett Corp., Los Angeles	
Catapults		977,150	Baldwin-Lima-Hamilton Corp., Philadelphia	
Starters	1,415	601,120	Bendix Aviation Corp., Teterboro, N. J.	
Meters	3,592	101,718	Realty & Industrial Corp., Bethlehem, Pa.	
Turbine compressor	196	3,160,000	AiResearch Mfg. Co., Los Angeles	
Tumbler, washers	50	186,674	The American Laundry Machinery Co., Cincinnati	
Aircraft jacks .....		...	Steel Products Engineering Co., Springfield, Ohio
Electric furnaces .....		...	Dispatch Oven Co., Minneapolis, Minn.
Generators .....		...	Jack & Heintz Precision Industries, Inc., Cleveland
Compressors .....		...	Cornelius Co., New Brighton, Minn.
Spare parts .....		...	General Metals Corp., Burbank, Cal.
Starters .....		...	Jack & Heintz Precision Industries, Inc., Cleveland
Aircraft parts .....		...	Consolidated Vultee Aircraft, San Diego, Cal.
Power presses .....		...	E. W. Bliss Co., Canton, Ohio
Printing presses .....		...	Harris Seybold Co., Cleveland
Landing gear .....		...	A. O. Smith Corp., Milwaukee
Aircraft .....		...	Douglas Aircraft Co., Inc., Long Beach, Calif.
Compressor .....		...	American Brake Shoe Co., Rochester, N. Y.
Speedometer .....		...	Stewart Warner Corp., Chicago
Gear parts .....		...	Chrysler Corp., Detroit

Steel Mill DO Percentages Leap Higher—Stainless, 50 Pct

Washington — Percentages of some steel products which producers must reserve on their order boards to meet defense rated orders have again been increased.

The increased reserves reflect the accelerating demand of military orders, as well as those expected to result from NPA's MRO program.

Steel producers have been individually notified by NPA of the new increases in order board reservations. The increases range from 5 pct in the case of carbon steel wire to 28 pct for electrical sheets and strips of alloy steel. For eight stainless steel products, the reserve has been increased to 50 pct of monthly production.

No change has been made in the "lead time" for filling rated orders. Similarly, no change was made in the previous percentage reserves for the bulk of the following products: Steel castings, fabricated steel forgings, structural steels, pilings, ingots, rails or skelp.

CARBON STEEL PRODUCTS	Previous Reserve	New Reserve
Blooms, slabs & billets	10	20
Billets, projectile & shell quality	(1)	(2)
Tube rounds	15	30
Wire rod	15	20
Plates, other	20	(1) 25
Wheels	0	5
Axes	0	5
Bars, hot-rolled	15	20
Standard pipe	5	10
Mechanical tubing	15	25
Wire, nail	5	10
Wire, barbed	5	10
Sheets, hot-rolled	17	25
Sheets, other, coated	10	18

ALLOY STEEL PRODUCTS

Wire rods	25	45
Plates, other	20	25
Wheels	0	5
Axes	0	5

STAINLESS STEEL PRODUCTS

Tube rounds	25	50
Sheet bars	25	50
Plates, other	25	50
Bars, hot-rolled	25	50
Bars, cold-finished	25	50
Mechanical tubing	25	50
Pressure tubing	25	50
Wire, drawn	25	50
Sheets, hot-rolled	25	40
Sheets, cold-rolled	25	40

(1) No product limitation was set; this product was subject to direct negotiation by NPA if necessary.

(2) To an amount equal to 25 pct of the tonnage represented by the carbon blooms, slabs and billets set aside.

(3) In addition, all hot-rolled sheet producers are to set aside for plates an amount equal to 5 pct of the average monthly shipments of hot-rolled sheets in the base period Jan. 1, 1948 through Aug. 31, 1950.

NPA Drops Steel Use 20 Pct, Plans 1 Million Ton Civilian Cut

Estimates 27 pct steel output will go to defense, supporting programs.

Washington — Second quarter non-defense use of steel by the automobile, furniture, appliance and other durable goods industries has been cut to 80 pct of the base period (first 6 months, 1950) under a new order, M-47.

NPA said that it expected to reduce use of steel for strictly civilian type uses by at least a million tons during the quarter. At that time, the NPA expects to have its CMP ready to go into effect.

New amendments to M-7 and M-12 ordered a reduction from the present 80 pct rate of copper consumption to 75 pct for the second quarter and extended for another 3 months the current 65 pct rate for aluminum.

Similar orders are being issued for nickel and zinc. Producers of brass and copper wire mill products and producers of foundry products will continue at their current rates of 80 and 100 pct, respectively.

Finished Steel Needs

Military and supporting programs will require 5,000,000 tons of finished steel (27 pct of output) during the second quarter, NPA estimates. The MRO program will require an estimated additional 1,000,000 tons of the available supply.

The new steel order places no limitation on the amount to be used for manufacture of replacement parts.

But assemblers of goods listed in Schedule A of the order who do not make the parts themselves are hard hit. They are restricted to a rate of 40 pct of the base period rate for the quarter.

Manufacturers and assemblers who use less than 100 tons of steel per quarter will be permitted the full 100 pct of their base period rate.

Manufacturers of the consumer

durables listed in Schedule A who used conversion steel during the base period will be required to continue its use at the same rate.

Machine Tool Industry Gets Priority Help for Own Expansion

Washington—A procedure for providing machine tools necessary for expansion of the machine tools industry to meet the needs of defense production has been established by NPA.

Machine tool manufacturers may apply directly to Machinery Div., National Production Authority, for priorities assistance in getting machine tools.

Firms applying should give detailed information regarding the machines they need, explaining why they are needed, and show that alternate facilities are not available. They must show a priority rating is the only means by which they can get the tools.

Industry Controls This Week:

NPA Orders

M-5, Aluminum set-aside—Raises DO acceptance ceiling for independent non-integrated primary aluminum fabricators from 6½ pct to 11½ pct. Effective Apr. 1.

M-7, Aluminum amendment—Second quarter use for non-defense purposes permitted at 65 pct.

M-8, Tin amendment—allocates tin, names RFC as sole buyer, and adds some second quarter restrictions.

M-12, Copper restriction—Cuts second quarter non-defense copper use to 75 pct.

M-46, Oil and gas industries—given priority assistance in obtaining tubing and casing.

M-47, Steel cuts—Second quarter non-defense use of steel in automobiles and durable goods industries cut to 80 pct of base period (first 6 months 1950).

M-48, Bismuth conservation—Limits use of bismuth metal or alloys to essential rearmament purposes after Mar. 31.

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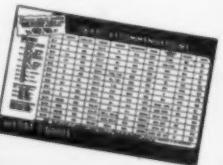
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**TCI Shutdown Short-Lived But
50,000 Tons of Steel Will Be Lost**

Birmingham — The Tennessee Coal, Iron & Railroad Co. shutdown last week was short-lived—but before facilities could again pick up normal momentum, an estimated 50,000 tons of steel production was to have been lost.

The 10-day strike which came to a head last week when iron ore miners formed picket lines on Mar. 5 was ended on Mar. 6. Some workers returned to work on the next morning shift but operations were held back for 2 or 3 days. The back-to-work movement started after Elmer Malloy, director of the contracts division of USW, held several conferences here with local union chiefs. He promised the miners a meeting with TCI officials to settle grievances over alleged new job discrimination.

**Full Allocation of Pig Tin
Ordered by NPA, Starting May 1st**

Washington — Complete allocation of pig tin to domestic users will become effective May 1, NPA announced in issuing Amend. 3 to order M-8. The order also designates the Reconstruction Finance Corp. as the sole importer of tin and establishes a temporary, seasonal increase in second quarter tin allocations, primarily to provide for the canning of perishable foods.

No person is permitted to either deliver or accept delivery of any pig tin except upon specific authorization of NPA. Each month, beginning May 1, NPA will issue an allocation authorization to the suppliers of pig tin, and the purchasers will be notified of their allotment.

Under new import restrictions, persons who have contracted to purchase and sell tin prior to Mar. 12 will be permitted to complete these transactions, provided they report their contracts to NPA, and receive approval, on or before Mar. 23.

The second quarter increases in use allocation to provide for the spring and summer food pack, per-

• News of Industry •

mit tinplate and terneplate manufacturers to increase temporarily their use of pig tin to 95 pct of their monthly base period (first 6 months of 1950) use during the second quarter. All other users are permitted 90 pct of their monthly base period use during the second quarter.

Croning Process Not a Cure-All

Cleveland—The shell mold or Croning process for making foundry molds is not a general remedy for all foundry problems, according to W. A. Geisler, foundry engineer, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

Speaking before the Gray Iron Div. of the Fourth Ohio Regional Foundry Conference at Case Institute of Technology here last week, Mr. Geisler pointed out that, while Croning does make possible high production of parts with closer tolerances, the high cost of making the metal patterns limits its use to parts produced in large quantities, and bridges the gap between green sand and permanent molding techniques.

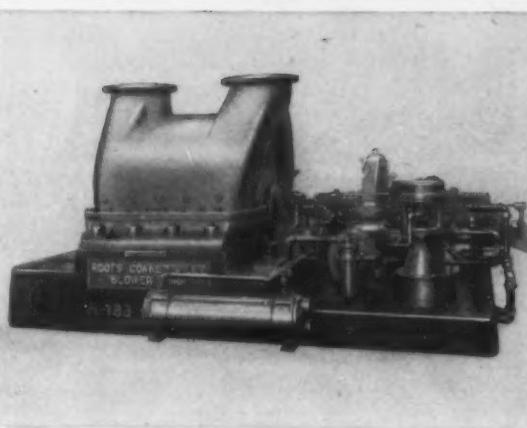
Many large companies working on this development have advanced beyond the pilot plant stage and have achieved large-scale production on some parts, although we are behind the Germans, who have been in production for about 4 years on such items as air-cooled cylinders and cylinder heads.

Rail Labor Dispute Shuts Down J&L

Pittsburgh—A dispute between the Monongahela Connecting Railroad Co. and the Brotherhood of Railroad Trainmen forced a shutdown of the Pittsburgh Works of Jones & Laughlin Steel Corp. last Sunday and Monday. Production was likely to be affected throughout the week.

The company charged that a "slowdown" by the railroaders over a wage demand made it unsafe to operate the plant. Some 10,000 steel workers were idle and daily production loss was 4500 ingot tons. The union charged a lockout.

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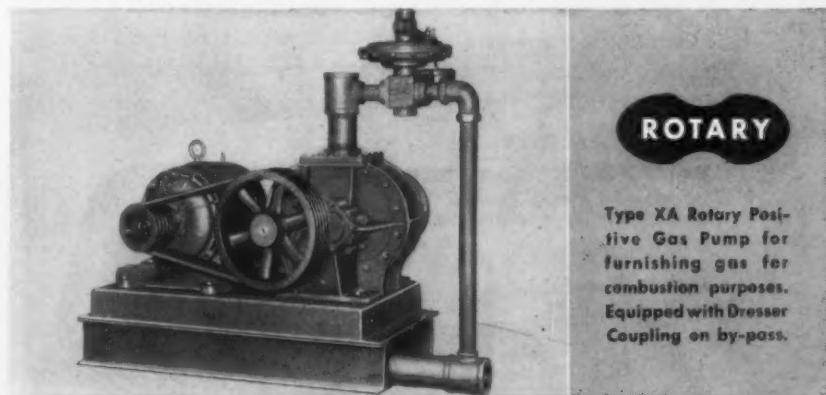
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NPA Gas, Oil Program Sets Priorities for Casing and Tubing

Washington — A program to provide steel casing, tubing and drill pipe for drilling oil wells at a rate of 43,400 wells yearly has been established by NPA for the oil and gas industries.

NPA estimates the program will require 157,000 tons of steel products monthly. NPA directives will order mills to provide steel for the program.

Order M-46, effective immediately, provides: (1) Operators may issue priority rating (DO-97) to obtain maintenance, repair, operating supplies and laboratory equipment. The provision regarding procurement of MRO materials is required because the general MRO regulation (Reg. 4) does not meet specialized requirements of the industry.

(2) Effective Apr. 1, operators may use DO-48E to obtain casing, tubing and drill pipe for emergency purposes.

(3) Effective July 1 operators may use a DO priority rating (DO-48) to obtain materials for normal operating equipment.

Each MRO delivery order of \$100 or more must be accompanied by a statement telling the specific use to which the material is to be put and the price, quantity, and description of the material.

U.S. to Boost Cold Rubber Output

Cleveland—Cold rubber output at Goodrich Chemical's Co.'s government-owned plant at Port Neches, Tex., will be boosted 50 pct in 2 months. The government has approved installation of refrigeration equipment, at a cost of \$350,000, to raise production from 30,000 to 45,000 tons. Annual capacity now is 60,000 tons.

Columbus Pipe Buys New Plant

Columbus, Ohio—Columbus Pipe & Equipment Co., this city, has purchased Mt. Vernon Bridge Co., Mt. Vernon, Ohio, for a reported \$1,100,000. Mt. Vernon Bridge will continue separate operations and plans are pending to expand its operating facilities.

U.S. May Raise Coal Exports To Help Out in Europe Shortage

New York—Coal shipments to Europe from America may reach 10 or 15 million tons in 1951 as for the first time England becomes an importer and other nations slump in their output quotas, reports the National Industrial Conference Board. U. S. exports to Europe in 1950 were only one-half million tons.

U. S. consumption should total about 480 to 500 million tons this year and output "could apparently be raised" to 550 million tons, allowing a substantial export margin. English mines have reduced production because of manpower losses, and exports to dependent countries have been curtailed. Total coal output of western Europe in 1946 was about two-thirds of prewar and because of manpower dispersal and inadequate equipment could not bounce back to needed quotas.

Slow British Tinplate Exports

London—Curtailment of British exports of tinplate to Russia, Argentina, France and other European countries has been made, effected to meet rising home needs. Despite increased 1950 production, 17,000 tons above 1949, little additional production is expected until a new strip mill is completed in South Wales.

More tinplate is being used for defense, and present estimates are the armed forces will use three times as much tinplate as in 1950. Stockpiling is also contributing to the shortage.

GE Powers Big Ore Carrier

Schenectady—Power for the biggest Great Lakes ore carrier ever built, the 690 ft ship on order for National Steel Corp., will be supplied by General Electric. Powered by a 7000-hp GE reduction turbine gear set, the ship is designed to carry 20,340 tons of ore. The ship's keel is scheduled to be laid in August by American Shipbuilding Co.

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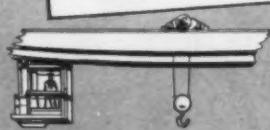
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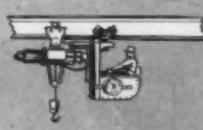
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English Scrap Imports From Germany Flop—Shortage Seen

London — German scrap steel exports in England have been falling and the British steel industry is worrying about future supplies. Almost 2 million tons were imported last year, mainly from Germany, which is now closing up because of a revived German industry and depletion of war-created scrap.

Not more than 1 million tons will come from that country in 1951, it is expected. This deficit might have been overcome by boosting pig iron production but that is made impossible because of shortages in rich iron ore, blast furnace coke, and shipping shortages caused by increased imports of coal from the United States.

Republic to Build 150,000-Ton Seamless Tube Mill in S. Chicago

Chicago — A 150,000-ton seamless tube mill, its first one here, will be built by Republic Steel Corp. at its South Chicago works to start production about April 1952. The mill will produce seamless steel tubing in sizes from 2½ in. to 9½ in. and will draw steel from expanded steelmaking capacity at the plant.

Cost was undisclosed but the major part will be amortized under 5-year tax writeoff provisions for defense plants. Employing 800 additional workers, the mill will make ordnance, defense, and petroleum and gas industry products.

Tube mill facilities also to be built include: a reheating furnace, two reeling machines, and finishing and shipping equipment.

British Tighten Scrap Controls

London — Further moves to speed the flow of nonferrous scrap into English mills will be taken soon by the Ministry of Supply. A new order will control acquisition of scrap copper, lead and zinc. Price control action has already been taken to discourage hoarding of important nonferrous scrap.

Europe's Non-Russian Steel Output 75 Million Tons by '53

London—Europe, excluding Russia, expects to have 75 million metric tons of crude steel capacity against 60 million tons in 1950, according to a report of the Economic Commission for Europe.

Bulk of this capacity will be in Western Europe where estimated production by 1953 will be 63.2 million tons.

Output at the estimated rate will depend on adequate supplies of raw materials and continued high demand for steel.

Europe's steel needs in 1953 are estimated at 60 million ingot tons, exclusive of armaments. This represents an increase of 9 million tons over 1949. American armament needs are not regarded as a permanent outlet for European steel, and steel uses will have to be expanded to take the place of present high American demand.

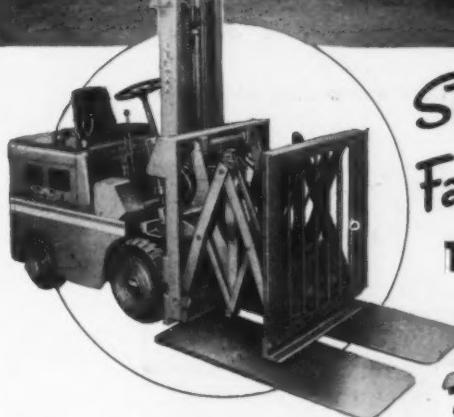
Support for Synthetic Fuels Industry Pledged by Chapman

Washington — With international trouble threatening imports, U. S. need for petroleum products increasing, and inflated costs of developing new fields, Secretary of Interior Oscar L. Chapman promised to put the government's shoulder behind private enterprise to establish "promptly" a synthetic liquid fuels industry based upon coal and oil shale.

Offering U. S. assistance to competent organizations offering sound proposals for shale-oil operations, Mr. Chapman added that the Dept. will also support construction of one or two plants to produce synthetic liquid fuels by direct hydrogenation of coal.

One in, One out—Furnace Score

Pittsburgh—U. S. Steel's blast furnace score was one in, one out recently. Furnace No. 1 at its Edgar Thomson Works was blown in Feb. 28 after a relining shutdown since Nov. 17. Carrie blast furnace No. 1 was blown out on Mar. 4 for partial relining.



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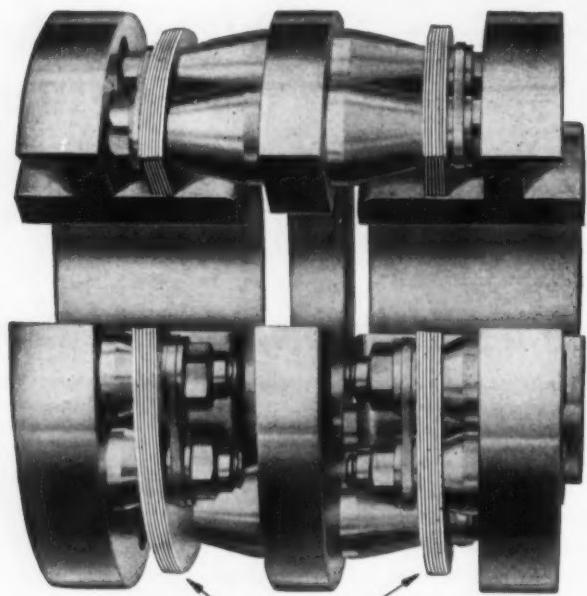
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FOR POWER TRANSMISSION • REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes: $\frac{1}{2}$ to 40,000 HP — 1 to 30,000 RPM.

Specialists on Couplings for more than 30 years



PATENTED FLEXIBLE DISC RINGS

**BACKLASH
FRICTION
WEAR and
CROSS-PULL
are eliminated
LUBRICATION IS
NOT REQUIRED!**

**THE THOMAS PRINCIPLE GUARANTEES
PERFECT BALANCE UNDER ALL
CONDITIONS OF MISALIGNMENT.**

* * *

NO MAINTENANCE PROBLEMS.

* * *

**ALL PARTS ARE
SOLIDLY BOLTED TOGETHER.**



Write for the latest reprint of our Engineering Catalog.

**THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA**

STEEL CONSTRUCTION NEWS

Fabricated steel awards this week included the following:

- 1800 Tons, Pittsburgh, shelter shed for Pittsburgh station of Pennsylvania RR, to American Bridge Co., Pittsburgh.
- 560 Tons, Newcastle County, Del., state highway bridge, to Phoenix Bridge Co.
- 500 Tons, Frederick, Md., building for Lansdale Tube Co., to Lehigh Structural Steel Co.
- 280 Tons, Superior, Wis., 16 beam spans for Omaha Railway Co., to American Bridge Co.
- 200 Tons, Ft. Worth, Tex., beam spans for Rock Island RR, to American Bridge Co.

Fabricated steel inquiries this week included the following:

- 2000 Tons, Hastings, Minn., U. S. Engineers office, Omaha, storage tanks.
- 1100 Tons, Des Moines, Solar Electric building, Whites Co. general contractor.

Reinforcing bar awards this week included the following:

- 1000 Tons, Beverly, Ohio, American Gas and Electric Co., to Builders Structural Steel Co.
- 1000 Tons, Syracuse, N. Y., Skyline Apartments, Turner Construction Co., Philadelphia, general contractors, to Bethlehem Steel Co., Bethlehem.
- 600 Tons, Detroit, caisson job to C. J. Glasgow.
- 300 Tons, Yeadon, Pa., Fitzgerald Mercy Hospital, McCloskey & Co., Philadelphia, general contractors, to Bethlehem Steel Co., Bethlehem.
- 200 Tons, West Reading, Pa., sewage treatment works, Tri-County Contractors, Elkins Park, Pa., general contractors, to Bethlehem Steel Co., Bethlehem.
- 180 Tons, Lititz, Pa., sewage disposal plant, Rice & Weidman, Inc., Lancaster, Pa., general contractors, to Bethlehem Steel Co., Bethlehem.
- 150 Tons, La Porte, Ind., Allis Chalmers Mfg. Co., to Truscon Steel Co.
- 150 Tons, Akron, highway project, to U. S. Steel Supply Co.
- 150 Tons, Philadelphia, Frankford Creek Flood Control, Progressive Builders, Inc., Pennsauken, N. J., general contractors, to Bethlehem Steel Co., Bethlehem.
- 150 Tons, Dallas, Pa., central office building for Commonwealth Telephone Co., Sordoni Construction Co., Wilkes-Barre, general contractors, to Bethlehem Steel Co., Bethlehem.
- 150 Tons, State College, Pa., Pennsylvania State College chemistry laboratory building, S. H. Evert Co., Bloomsburg, N. J., general contractors, to Bethlehem Steel Co., Bethlehem.
- 100 Tons, Elmhurst, Ill., York High School, to Ceco Steel Products Co.

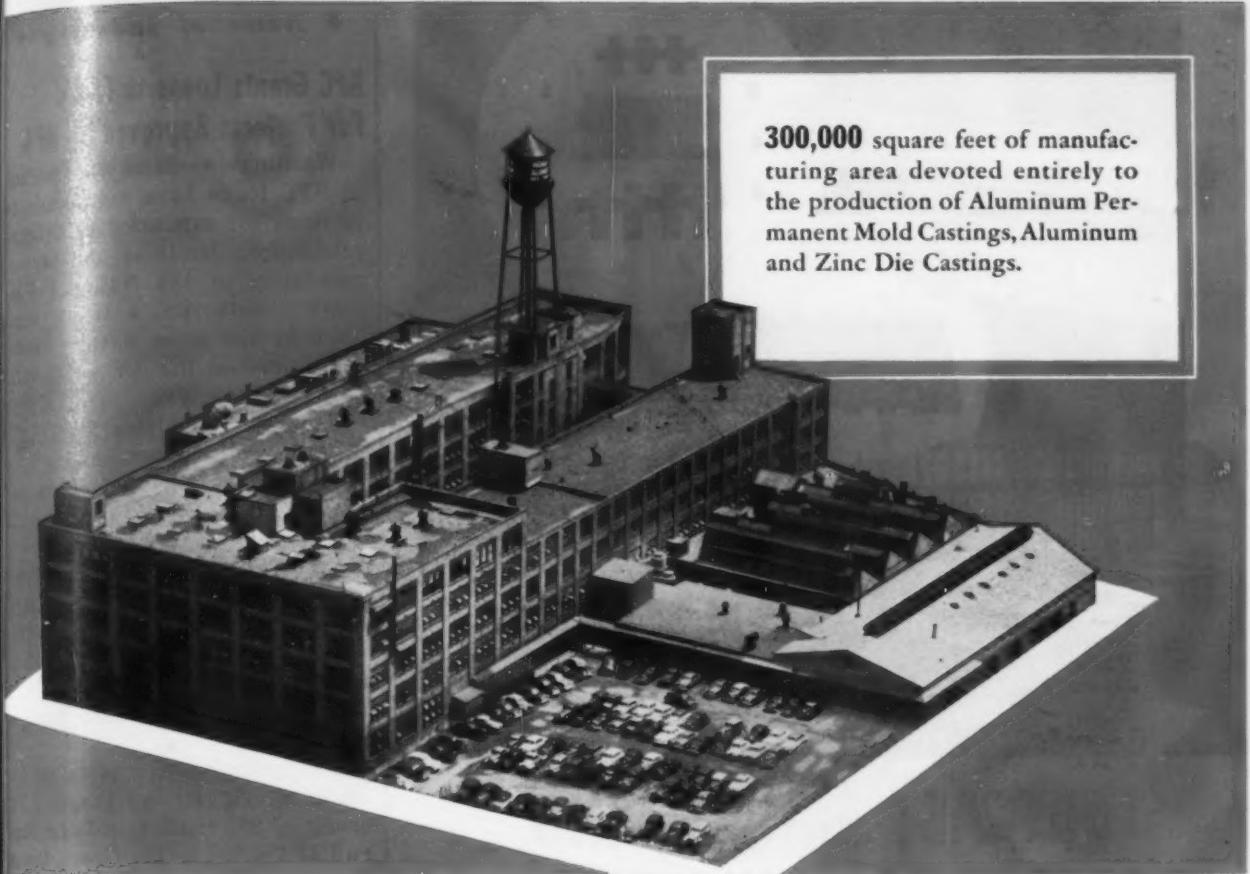
Reinforcing bar inquiries this week included the following:

- 2000 Tons, Dayton, waterworks.
- 1200 Tons, Dayton, Ohio, National Cash Register Co.
- 500 Tons, Iron Mountain, Mich., Wisconsin Michigan Power Co.
- 470 Tons, Chicago, Minnesota Mining Co.
- 270 Tons, Fostoria, Ohio, sewage treatment plant.
- 135 Tons, South Bend, Ind., Torrington Co.

May Not Extend DO-97 Ratings

Washington — Businesses may not extend DO-97 ratings to obtain inventory of maintenance, repair and operating supplies they sell in anticipation of DO-97 orders they expect to receive later, NPA said.

300,000 square feet of manufacturing area devoted entirely to the production of Aluminum Permanent Mold Castings, Aluminum and Zinc Die Castings.



MONARCH IS MOBILIZED To Serve You Now!

Monarch has already been selected for prime and sub-contract defense requirements. We have capacity for additional production of aluminum permanent mold, aluminum and zinc die castings, plus facilities for complete assembly work regardless of casting requirements.

Monarch-Men work at every useful level in industry. They are in an excellent position to

help you solve your own casting and related production problems.

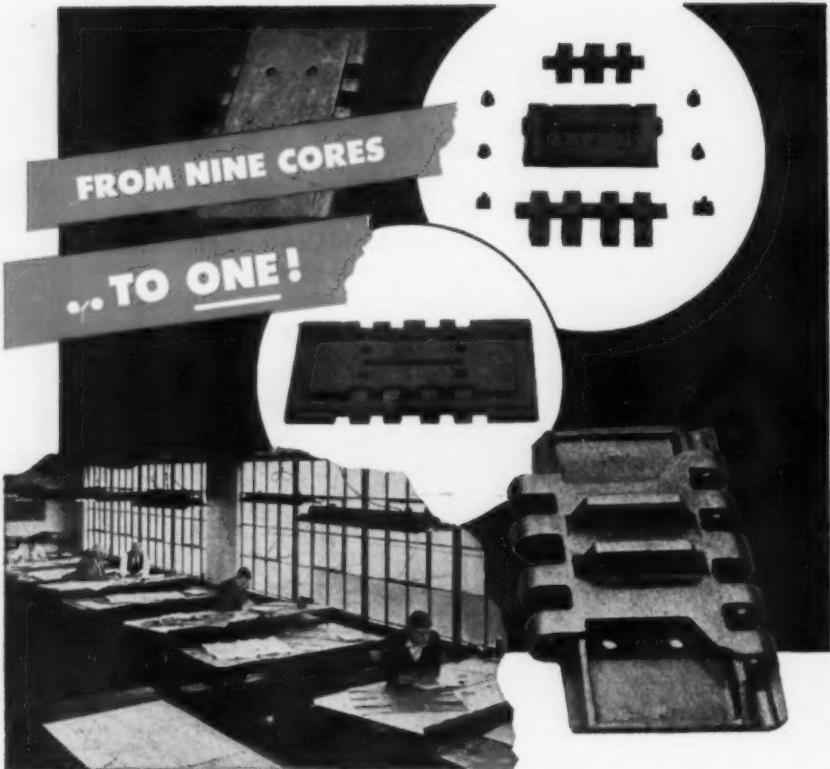
Monarch, under one management for 37 years, has demonstrated the engineering, technical and production capabilities to meet any specific emergency.

Monarch welcomes the opportunity to work with you today in giving the widest possible casting or assembly services, utilizing the full scope of Monarch's unique facilities.

WRITE TODAY for your copy of our new "FACT-FILE" folder which illustrates and describes Monarch's outstanding facilities. You'll want it for your castings source file.



MONARCH ALUMINUM MFG. COMPANY • Detroit Avenue at W. 93rd Street • Cleveland 2, Ohio



UNITCAST ENGINEERING SAVES ON PRODUCTION COSTS . . IMPROVES QUALITY!

The illustrated steel casting was formerly made from nine hand made cores, resulting not only in slow production but loss of accuracy. So Unitcast Engineering went to work. By replacing the nine hand made cores with one unit blown core, increased production was balanced, quality improved, and all core holes on every casting were in perfect alignment. Here's just one of the many ways Unitcast facilities provide better customer service, improve the product and keep production costs competitive.

UNITCAST
Corporation
QUALITY STEEL CASTINGS



Give us a chance to offer a "cast steel" answer for your parts problem. Our suggestions while your product is in the design stage will pay continuous dividends. Write or call today. Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio. In Canada: Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

UNITCASTINGS ARE FOUNDRY ENGINEERED

• News of Industry •

RFC Grants Loans to Firms For Projects Approved by NPA

Washington—Some \$43 million in RFC loans have been made to 16 firms for expansion of defense production facilities on recommendation of the National Production Authority, a recent summary by the latter agency shows.

Included on the list is \$25,423,201 to Lone Star Steel Corp., \$7,800,000 to Hazleton Steel Tubing Co., both for expanding tubing production; \$3,556,126 to Green River Steel Corp., for a new steel plant at Owensboro, Ky.; \$1,700,000 to Spencer Wire Corp. and \$775,000 to Standard Cable Corp., for additional wire-making facilities; and \$260,295 to Boston Electro Steel Castings Co. for expansion of castings production.

The foregoing figures do not include previously advanced RFC credit of \$50 million to Lone Star and \$3,556,000 to the Green River project. Other NPA-approved loans include:

W. L. Maxon Corp., \$1,569,635; Thompson Trailer Corp., \$555,000; Keddy Machine Co., \$450,000; C. L. Bryant Corp., \$475,000; Pacific Electric Contractors (Alaska), \$293,000; Marine Aircraft Corp., \$200,000; Fontaine Truck Equipment Co., \$180,000; Algonac Mfg. Co., \$100,000; Champion Canvas Supplies, \$52,000, and Truck Body & Equipment, \$25,000.

Armco Sets Record Production

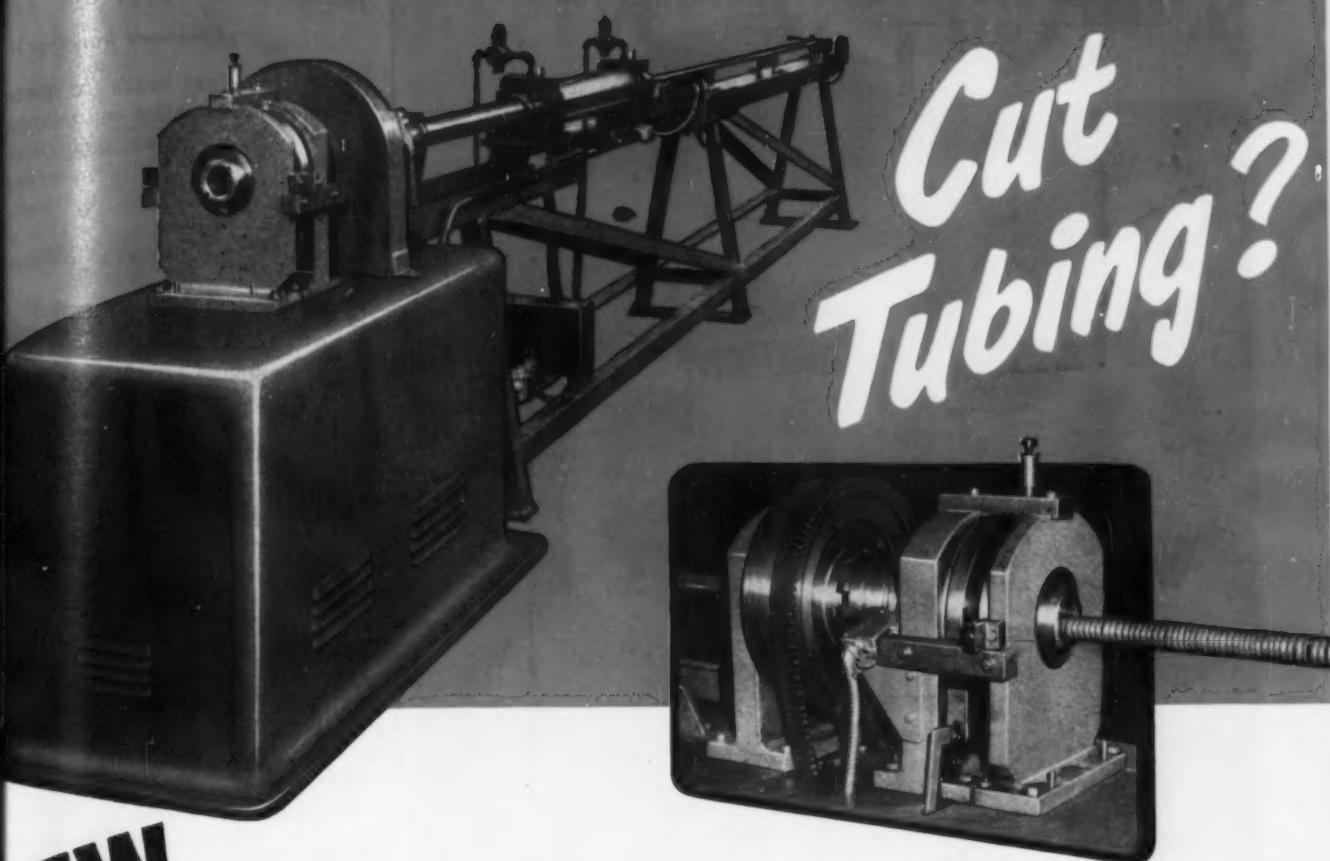
Middletown, Ohio—New records for production and earnings for 1950 were reported recently for Armco Steel Corp. by Charles R. Hook, chairman. Net earnings for 1950 were \$47,000,505 compared with \$30,918,202 during 1949. Ingots output during 1950 was 3,958,727 net tons, 626,466 tons greater than was any previous Armco record.

Canco Has Record Earning

New York—Net income of \$14,873,172 for 1950, compared with \$12,350,844 for 1949, has been reported by Continental Can Co. Inc. Earnings for 1950 were the highest in the company's history.

Looking for a Better Way to

Cut Tubing?



NEW
MCKAY
TUBE CUTOFF

IS YOUR ANSWER . . .

CHECK THESE OUTSTANDING FEATURES

- ✓ SIMPLICITY OF DESIGN With economy in mind.
- ✓ SIMPLICITY OF SET UP Ordinary shop personnel entirely competent after brief instruction.
- ✓ SIMPLICITY OF OPERATION Fully automatic—fool-proof.
- ✓ SPEED OF OPERATION Rates as high as 60 cuts-per-minute, depending on length of cut tube.
- ✓ NO LOSS OF METAL Tube wall is sheared—no metal removed.
- ✓ QUALITY OF CUT Practically burr free.
- ✓ TUBE STATIONARY DURING CUT Eliminating chances of marking.
- ✓ CONCENTRICITY OF TUBE Original concentricity maintained.
- ✓ LENGTH TOLERANCE Positive stops control travel of feed cylinder—close length tolerances easily maintained.
- ✓ TOOLING Simple, concentric dies—easily produced in your own tool room.
- ✓ LOW MAINTENANCE Early models have been in continuous operation—over 2,000,000 cuts with only occasional die grinding required.

M^CKAY MACHINE
YOUNGSTOWN, OHIO

Company

M^CK

ENGINEERS AND DESIGNERS OF
EQUIPMENT FOR THE AUTOMOTIVE,
FABRICATING AND STEEL INDUSTRY

publications

Continued from Page 34

lecting the right brush for specific jobs, and information on equipment requirements, brush characteristics, operating conditions, surface speeds and brush usage. Osborn Mfg. Co.

For free copy insert No. 7 on postcard, p. 14.

Lubrication Equipment

Universal hydraulic grease fittings, couplers, swivel couplers, control handle for boosting grease pressures to 12,000 lb and top oiler for upper cylinder lubrication are illustrated and described in the 14-p. 1951 Industrial Catalog. Dimensional data are listed, and a handy interchange chart is included. Universal Lubricating Systems, Inc. For free copy insert No. 8 on postcard, p. 14.

Oil and Water Cooler

The LK-Fin cooler, distinguished by the use of helically-finned heat transfer elements instead of conventional bare tubes, is described in a new 20-p. booklet. The bulletin explains how the elements provide a lighter, more compact and less costly unit for a given cooling service, and diagrams show comparisons of length and number of tubes and size of units for equivalent heat transfer surface. Complete selection data are given for various ranges of duties. Griscom-Russell Co.

For free copy insert No. 9 on postcard, p. 14.

Staking Machine

The valuable extras that come as standard equipment in High Speed stakers are listed in a new 4-p. folder illustrating various models and detailing specifications. Cross-sectional drawings show the double action operation of the hammer. Other equipment made by this company is also shown. The High Speed Hammer Co.

For free copy insert No. 10 on postcard, p. 14.

High-Speed Cameras

Specifications, applications and other information on Fastax high-speed motion picture cameras in 8-, 16-, and 35-mm sizes, and the 16-mm Oscilloscope camera, are covered in a new 12-p. booklet telling



General machine shop and maintenance work often require an all-purpose heavy duty open-gap forcing press adaptable to the many kinds of operations involved. That's what makes this versatile 100-ton R. D. Wood HydroLectric press valuable to you, from both cost and production standpoints. Moreover, it's used for machinery and appliance component assembly on a production basis, with the addition of suitable fixtures and accessories. It's made in various sizes and capacities, to strict R. D. Wood manufacturing standards. Write, without obligation, for literature.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALIVIATORS • INTENSIFIERS



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EST. 1803

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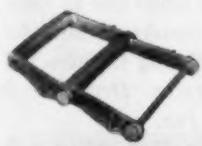
no ONE chain serves every purpose



Twelve endless strands of Link-Belt Class H pintle chain -- with pusher attachment every second link -- form a dependable conveying medium for this modern pipe cooling rack.

LINK-BELT offers the RIGHT chain for every job... engineered to meet your requirements

Typical chains from the complete Link-Belt line



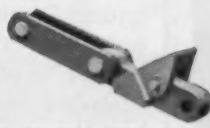
Class H drag chain—for drag conveyors, handling shavings or other refuse in runways or troughs.



Class C combination chain — popular, durable, low cost design for elevators, conveyors.



Class SS bushed roller chain with offset sidebars — for heavy drive service at moderate speeds.



Transfer chain with tilting dogs—for plate and slab travel, loads up to 300,000 pounds.

Link-Belt offers no single "cure-all" chain to handle every job. From the most complete line of chains and sprockets in the world—we can recommend the *exact* type to fit your particular job requirements—cast, combination, forged and fabricated steel, precision steel, roller or silent. So, whatever your chain problems, big or small, Link-Belt engineers will work with you or your consultants to help solve them.

LINK-BELT COMPANY, Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities.

12,008-1

LINK-BELT



CHAINS AND SPROCKETS

publications

Continued

how to set up a high-speed photographic laboratory. Complete information is given on new optics (delivering high resolution) on all these cameras. The cameras shown make motion studies of mechanical, electrical, physical, and anatomical reflexes and vibrations, and permit taking of pictures up to 14,000 frames per sec. *Wollensak Optical Co.*

For free copy insert No. 11 on postcard p. 11

Recorders, Tachometers

A completely revised, 20-p. edition of the L & N speed recorder catalog describes how accurate speed recording is increasing production efficiency, product quality, and output in the metalworking, paper, textile, glass, ceramic, and other industries. The booklet discusses and compares principles of operation of Micromax and Speedomax instruments, pointing out the special advantages of the latter where unusual requirements must be met. Numerous examples of speed recorder installations are illustrated. *Leeds & Northrup Co.*

10. The following table shows the number of hours worked by each employee.

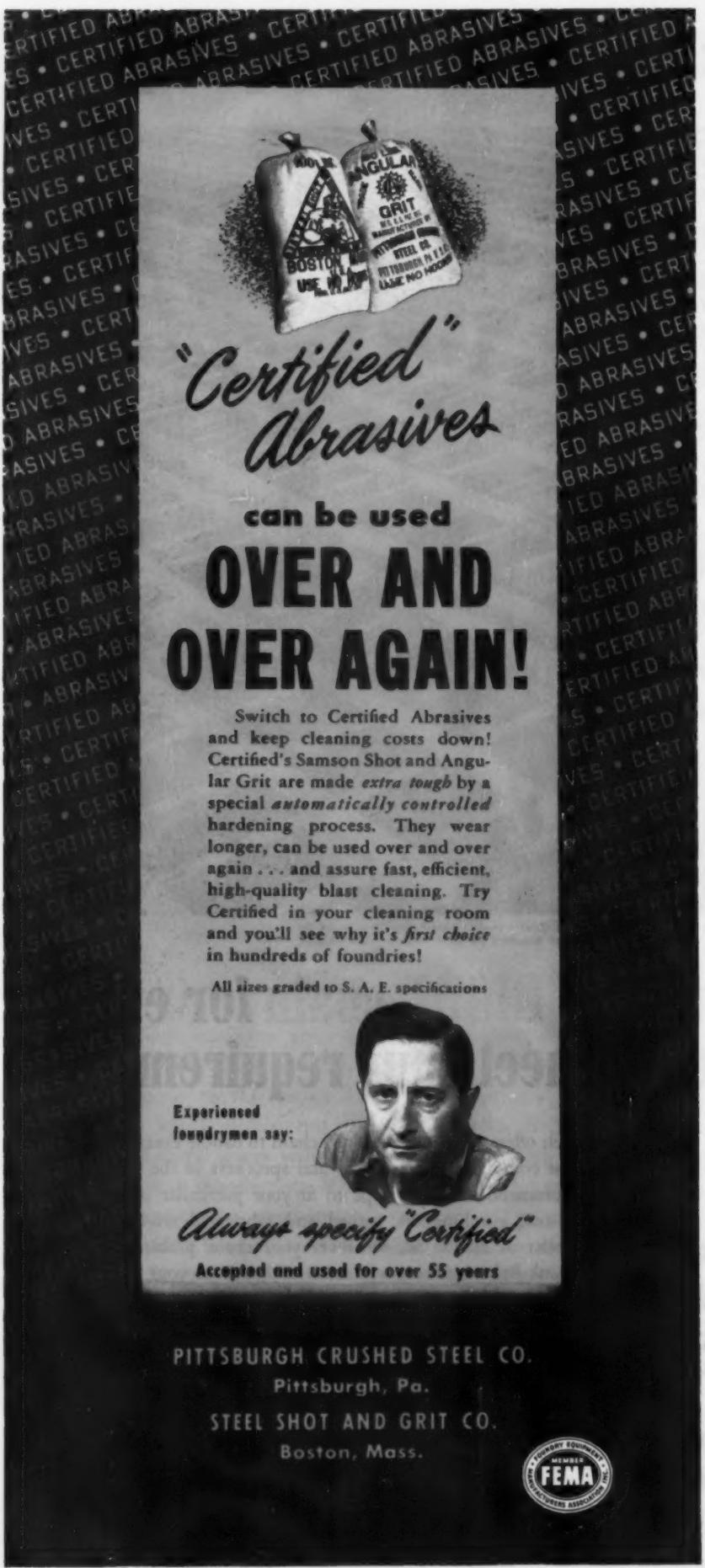
Minimizes Excavation

It is no longer necessary to tear up pavements and disrupt business to install sewers and other underground structures. A new folder tells how these jobs can be done simply and at low cost by tunneling with Armco liner plate, which insures ample strength and can be installed easily with a minimum of excavation. Physical properties are listed and photos show use as water and utility line tunnels, relining for highway and railroad tunnels, and underpasses. *Armco Drainage & Metal Products, Inc.*

For free copy insert No. 13 on postcard, p. 35.

Water Purification

The new Penfield permanent cartridge Demineralizer, for laboratories and other users of up to 10 gal per hr of high purity water, is described in a 6-p. folder. It tells how the unit is designed to attach to any wall near a tap, requires no heat or steam power for its opera-



TOOL COSTS don't show on the PRICE TAG!

When you're estimating production tool costs, look beyond the original price—to tool output. There's where you'll find real tool costs.

A production tool with lower first cost may offer a savings in original purchase price, yet due to its shorter service life, will actually cost more to use than a better tool having a higher first cost.

Interesting? You bet—and so are Apex production tools . . . sockets,

extensions, and adapters. Built expressly for your kind of work, Apex production tools offer greater freedom from quick wear-out and tool breakage . . . provide longer service life that increases productive output per tool, cuts tool costs to the minimum.

Write, on company letterhead please, for Catalog 19, a complete listing of standard Apex sockets, extensions, adapters. For special requirements, send sketch or blueprint.



APEX

sockets, extensions, adapters

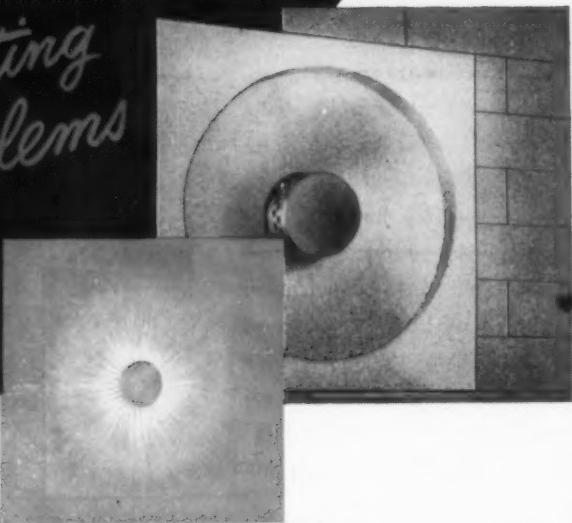
THE APEX MACHINE & TOOL COMPANY
1029 S. Patterson Blvd., Dayton 2, Ohio

SAFETY FRICTION TAPPING CHUCKS • VERTICAL FLOAT TAPPING CHUCKS • SELF-RELEASING AND ADJUSTABLE STUD SETTERS • POWER BITS FOR PHILLIPS, FREARSON, SLOTTED HEAD, CLUTCH HEAD, HEX HEAD AND SOCKET SCREWS • HAND DRIVERS FOR PHILLIPS, FREARSON AND CLUTCH HEAD SCREWS • AIRCRAFT AND INDUSTRIAL UNIVERSAL JOINTS • SOCKETS AND UNIVERSAL JOINT SOCKET WRENCHES.

The Answer to

High Efficiency High Heat Transfer Precision

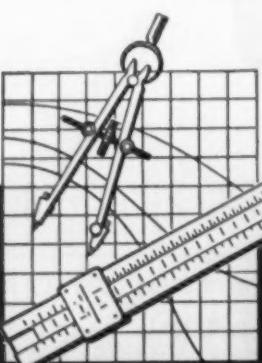
*Heating
Problems*



The BLOOM HTR BURNER

High Thermal Release

A unique precision burner for specialized high speed heating applications, the Bloom HTR Burner is ideal for use where fast heating and intense concentration of heat are needed. It will release up to 750,000 Btu per cubic foot of combustion volume. Turndown ratio of greater than 10 to 1 permits low input for holding purposes. Can be used with either gas or light oil.



WRITE for bulletin giving full details and description of this remarkable burner.

BLOOM
ENGINEERING CO., INC.

857 W. North Avenue

Pittsburgh 33, Pa.

publications

Continued

tion and is equipped with a sight indicator that enables the operator to adjust intake flow to the proper rate for producing super high purity water. Cost-cutting advantages are outlined. *Penfield Mfg. Co.*
For free copy insert No. 14 on postcard, p. 31.

New Diesel Engines

A new line of DR diesel engines is described in an 18-p. bulletin picturing the 4-cycle, direct injection, totally enclosed engines. Cut-away line drawings show construction and design, and complete specifications are listed. Also described are the supercharged SOR engine, the DRGO dual fuel diesel and the SDRGO super charged dual fuel diesel. *Worthington Pump & Machinery Corp.*

For free copy insert No. 15 on postcard, p. 31.

Flexible Shafting

Elliott flexible shafting with non-ravel core, for simplified power transmission at low cost, is described in a new 4-p. folder indicating factors which determine specifications and primary requirements in engineering flexible shaft power drives. The folder lists uses and information required by the company's engineering service in offering solutions to power transmission problems, without cost or obligation. *Elliott Mfg. Co.*

For free copy insert No. 16 on postcard, p. 31.

Specialized Lubricants

The well-known line of Lubriplate specialized lubricants, produced in various types of fluids and greases for a wide diversity of industrial applications, is described in a new 56-p. booklet. Complete product data are listed, with detailed information on an extensive variety of specific uses. The booklet points up the fact that lubricant suitability and not its initial cost is the governing factor, and that the true cost of lubrication must be reckoned from a standpoint of operating efficiency, power consumption and maintenance costs. *Fiske Bros. Refining Co.*

For free copy insert No. 17 on postcard, p. 31.
Resume Your Reading on Page 35



How many lives is a dollar worth?

The cost of a machine, fixture or broach is no gage of how well they will work together and produce together in any broaching installation—and in no process is proper relationship of tools, fixtures, and machines more vital than in broaching.

The wrong broach, fixture or machine always costs **MORE**.

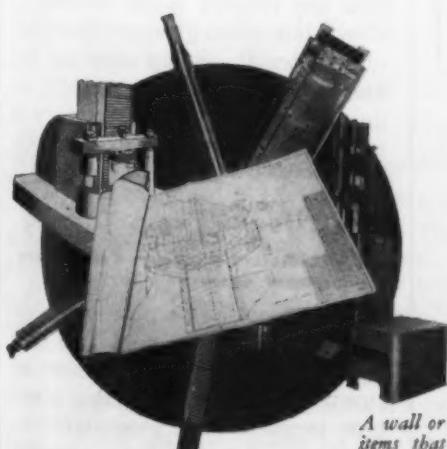
That cost, today, is measured not only in waste of time and money but potentially also *in American lives*.

The time is now. The place—wherever broaching is being adopted to produce more goods—faster . . . with the minimum of precious manpower . . . with the minimum of shut-downs.

To do that, broaching equipment—machine, fixtures, broaches—must be designed, integrated and built to do the job "right the first time."

That's why Colonial is ready and willing to check over your broaching layouts and recommend such changes as appear desirable on the basis of its vast experience with practically every conceivable type of broaching installation.

It costs you nothing. Have Colonial's specialists check broaching equipment or tooling before you release that order.

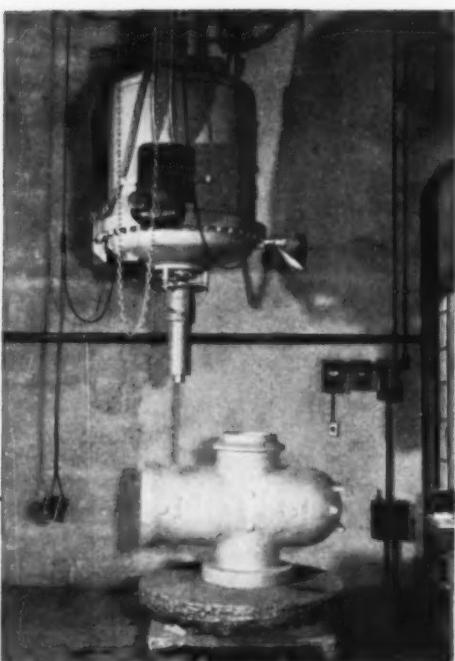


FOR YOUR TOOL ROOM
A wall or bulletin board poster of DO and DON'T items that should help you reduce broach maintenance cost. No charge. Ask for BN-1250.



production ideas

Continued from Page 38



Million-volt X-Ray Machine . . . an important part of the well-equipped Laboratories at Lebanon.

Watchmen Who Guard the internal integrity of Lebanon CIRCLE L Castings

MODERN testing devices and techniques provide the answer whenever a question arises regarding the soundness of steel castings.

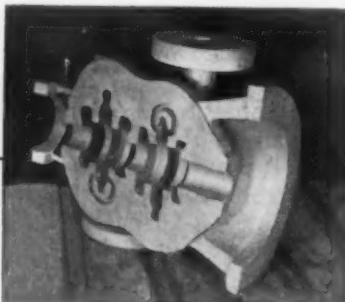
Now the internal integrity of Lebanon Castings is pre-determined. At Lebanon an "Old Eagle Eye" watchman—our million-volt X-Ray machine—does this job for us. However, "Old Eagle Eye" and his laboratory brothers cannot produce Lebanon castings with internal integrity—that is the job of other "watchmen", the workers in our plant. Production experience establishes the high quality of

Lebanon castings . . . modern testing procedures keep us on the mark.

Bring your casting needs to our engineers, for they are always glad to help. Lebanon REFERENCE CHARTS put the facts right in your hands—write for your copies today.

LEBANON STEEL FOUNDRY • LEBANON, PA.
"In the Lebanon Valley"

This Pump Casing is a typical example of a Lebanon casting that will stand up in service because it stood up on test.



LEBANON
ALLOY AND STEEL

Castings

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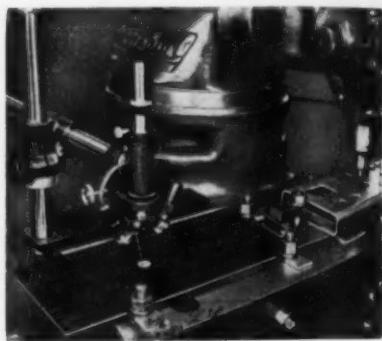
cut on the nibblers need very little finishing work and the most intricate shapes are said to be easily cut. New model machines have two-speed drive and variable stroke. *Campbell Machine Div., American Chain & Cable Co., Inc.*

For more data insert No. 31 on postcard, p. 31.

Duplicating Instrument

For precision hole spacing work on Bridgeport milling machines.

The principle of operation of a new optical follower duplicating instrument for attachment to the Bridgeport and other knee type milling machines is visually following a template plate for duplication on the workpiece. It is said to give coordinate locations accurate to 0.0002 in. The tracing finger employed on conventional duplicating machines is replaced with a fully



adjustable 32X microscope. Actually, the optical follower converts the Bridgeport into a high-efficiency jig borer. It also eliminates many drill jigs. The template plates for use in conjunction with the instrument are made with a height gage or other conventional layout methods, the pattern being scribed on steel, aluminized glass or other suitable material. Setup time for any hole duplication job is greatly reduced, and it is said accuracy is increased. *Boeckler Instrument Co.*

For more data insert No. 32 on postcard, p. 31.

Centrifugal Pump Testing

Torquemeters plus speed measuring equipment determine hp input.

Determination of horsepower input of centrifugal pumps has been simplified and said to be more accurate by means of electric strain type torquemeters, plus highly accurate speed measuring equipment,

"this is my lightweight traveling companion"



What was once a heavy piece of office equipment has now become a lightweight cross-country traveler. Dictating machines travel along with business men these days. That means they must be light, as well as rugged.

To get this combination of durability plus maximum lightness, manufacturers of dictating equipment are using magnesium die castings. As

a result, today's dictating machines incorporate several new features and still weigh appreciably less than previous models.

If you are making, or contemplate making, anything in which lightness is important, take a good look at magnesium. It has made many products better—more productive, easier to handle, more profitable to sell—it may improve yours.

MAGNESIUM

LIGHTENS THE LOADS OF AMERICA



*When lightness is important, consider
MAGNESIUM first!*

Magnesium offers lightness, excellent strength characteristics, cost-cutting machinability, and many other properties that may mean extra profit to you. For more information call your nearest Dow sales office or write direct.

Magnesium Division, Dept. MG-23

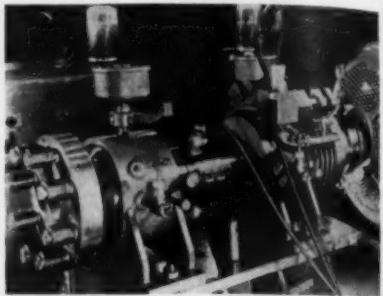
THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN
New York • Boston • Philadelphia • Washington • Atlanta • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada



production ideas

Continued

with a 60 pct saving in time and labor. Torque is measured by a Baldwin SR-4 torquemeter, that is based on SR-4 bonded resistance wire strain gages. These gages are bonded to a reduced section of a special alloy steel shaft at 45° with longitudinal axis. In this position they respond to the maximum tor-



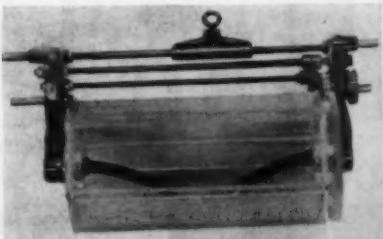
sional strains resulting from applied torque. Gages are connected to form a Wheatstone bridge by which torsional stresses are made cumulative. The four corners of the bridge are connected through slip rings to a measuring instrument. Torque, drive shaft speed, pump discharge and inlet pressure are all automatically recorded.

*Baldwin-Lima-Hamilton Corp.
For more data insert No. 33 on postcard, p. 35.*

Barrel Plating Cylinder

Made of Plexiglas; suitable for either cyanide or acid solution.

Plexiglas cylinders can be carried through the entire cleaning, pickling and plating cycle. Where cyanide solution is involved, the



cylinders are equipped with 90-tooth cast iron gears with both hangers of cast iron. Cast iron hangers are recommended for cadmium, cyanide copper, BBZ-200 zinc or any other alkaline or cyanide bath. Where the cylinder is used in an acid solution such as nickel, or carried through the

COMPARE

your present
ALUMINUM FINISHING PROCESS
with these advantages of
IRIDITE® Al-Coat

—see for yourself why more and more finishers of aluminum products are specifying Iridite Al-Coat for any wrought, cast or buffed aluminum part.

1. IN PROCESSING

Faster—Just one simple dip, 10 seconds or only two minutes, depending upon your finishing specifications. No sealing dip, no special drying.

Simpler—Non-electrolytic, no heating or exhaust units, operates at room temperature. No special precleaning baths required.

2. IN APPEARANCE

Clear—Protects metal without changing its original appearance.

Colored—Heavier, iridescent yellow film provides greater protection.

3. IN PERFORMANCE

Corrosion Resistance—Up to 1,000 hours salt spray on wrought stock, 250 hours on castings. Approved under government specifications.

Abrasion Resistance—Will not flake or peel from buffing, bending or scraping.

Paint Base—Blocks underfilm corrosion; grips paint, holds it firmly.

Welding—Finished surface can be spot welded, coating actually aids shielded arc welding.

Conductivity—Offers low surface resistance to electrical current.

4. IN COST

Comparative figures show that Iridite Al-Coat saves as much as 50% over other aluminum finishing processes. *Let us prove this to you.*

Write today for FREE SAMPLES of Iridite Al-Coat. Or, send samples of your product for test processing.

Iridite is approved under government specifications.



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INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD.

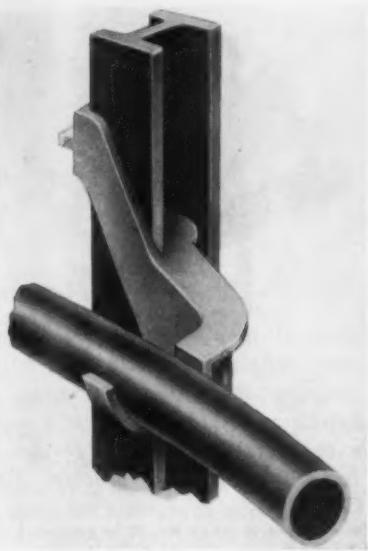
REPRESENTATIVES IN PRINCIPAL INDUSTRIAL CITIES: West Coast: L. H. BUTCHER COMPANY
Manufacturers of Iridite Finishes
for Corrosion Resistance and Paint Systems for Non-Ferrous Metals; A.R.P. Plating Chemicals.

tire cleaning and pickling cycle, 90-tooth Merlin or Plexiglas gears will be supplied and the hanger arms will be cast iron, rubber covered. High temperature Plexiglas satisfactory for temperatures of 185°F is used. *Hanson-Van Winkle-Munning Co.*
For more data insert No. 34 on postcard, p. 35.

Pipe Support

Hangs 1 ton from a girder face; no bolts or nuts are needed.

Known as the Wynip, a new clip is designed to support pipes, pulleys, platforms and other articles from girders. It is placed on the girder face with sockets round the edges, and hammered home. The



Wynip is cast in one piece of Black-heart malleable iron and has no loose parts. It will not slip; any increased load up to 1 ton causes the tapers on the clip to bite more firmly into the taper on the girder. In spite of its rigidity when in position it can be removed by a light blow under the hook once the load is removed. *Folsom-Wycliffe Foundries, Ltd.*

For more data insert No. 35 on postcard, p. 35.

Triple Lift Fork Truck

Tiers loads 197½ in. to utilize to the full, available storage space.

The new device permits standard 83-in. overall height telescopic lift trucks to "reach to the sky" and tier loads in greater than 16-ft stacks. It consists of an extra set of front channels and an additional lifting cylinder. The channels are hung directly in front of the regu-

To reduce rejects at the point of assembly, use forgings. **Forgings** offer almost a 100 per cent yield of sound parts because forgings are unusually free of concealed defects. This **REFERENCE BOOK** on forgings reveals the full significance of all the engineering, production and economic advantages that forgings offer.

Write for it.



Ask a forging engineer to explain how you can obtain the correct combination of mechanical qualities in forgings required for your product.

DROP FORGING ASSOCIATION

605 HANNA BUILDING
CLEVELAND 15, OHIO

Please send 60-page booklet entitled "Metal Quality—How Hot Working Improves Properties of Metal", 1949 Edition.

Name. _____

Position. _____

Company. _____

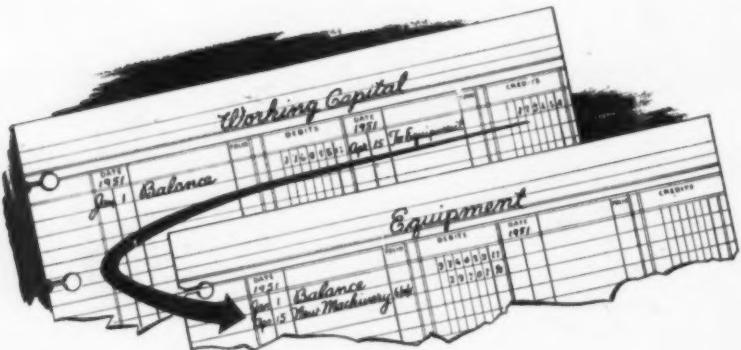
Address. _____

production ideas

Continued

lar telescopic channels and are operated by a separate control. The attachment can be quickly removed for normal fork truck operation.
Yale & Towne Mfg. Co.

For more data insert No. 36 on postcard, p. 31.



STOP losing working capital . . . when purchasing income-producing equipment

Whether your problem involves the purchase of a single piece of equipment or the complete installation of modern machinery in your plant, you can obtain the immediate use and benefit of the needed machines and facilities without losing any of the working capital of your business,—without draining the funds needed to carry inventory and receivables.

Financing these purchases through the Equipment Finance Department of The Philadelphia National Bank will enable you to buy income-producing machinery and often pay for it out of the profits realized through the operations of the machines themselves.

Regardless of the size of your business, you will find our long experience in financing manufacturers, distributors and operators an invaluable help in solving your equipment financing problems. We cordially invite you to discuss your situation with us.

*The Number One Bank in Philadelphia
in more ways than one*

THE PHILADELPHIA NATIONAL BANK

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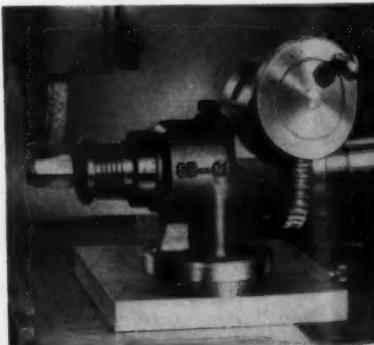
shop, it is able to handle all five body refinishing operations. Small and compact, the sander is easy to handle and said to work with equal ease over both flat or curved surfaces. *Sundstrand Machine Tool Co.*

For more data insert No. 37 on postcard, p. 31.

Rotary Lathe Attachment

**Handles work in horizontal plane
at any angle to the lathe spindle.**

Du-Ona-Lathe, a vertical rotary attachment, permits a lathe to do precision jig boring, with an ac-



curacy of work rotation said to be 1/10 of 1 degree. It fits quickly in place of the compound slide assembly of a 9-in. South Bend lathe. Models are available for other 9

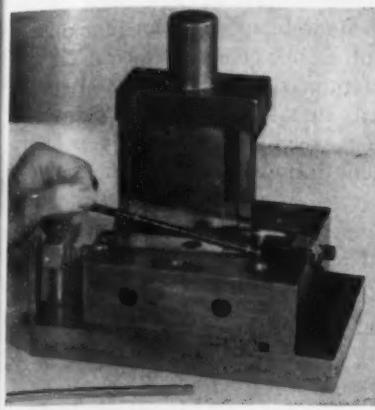
and 10-in. lathes. For use on a surface grinder, the attachment forms triangles, hexagons or unusually shaped punches and tools. Allan Mfg. Co.

For more data insert No. 38 on postcard, p. 35.

Rolling Fixture

Faced with carbide blanks, does work of thread generating machine.

Used in a No. 21 Bliss press, a simple rolling fixture, faced with blanks of Carboloy cemented carbide, can do the job of a thread



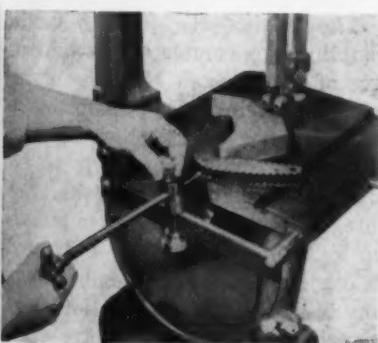
generating machine. The operation consists of rolling two spiral grooves 0.020 in. deep in 0.260 in. diam fan rotor shafts. The fixture rolls the shaft downward past two blades of Carboloy cemented carbide set at the proper helix angle. Carboloy Co., Inc.

For more data insert No. 39 on postcard, p. 35.

Screw Feed Attachment

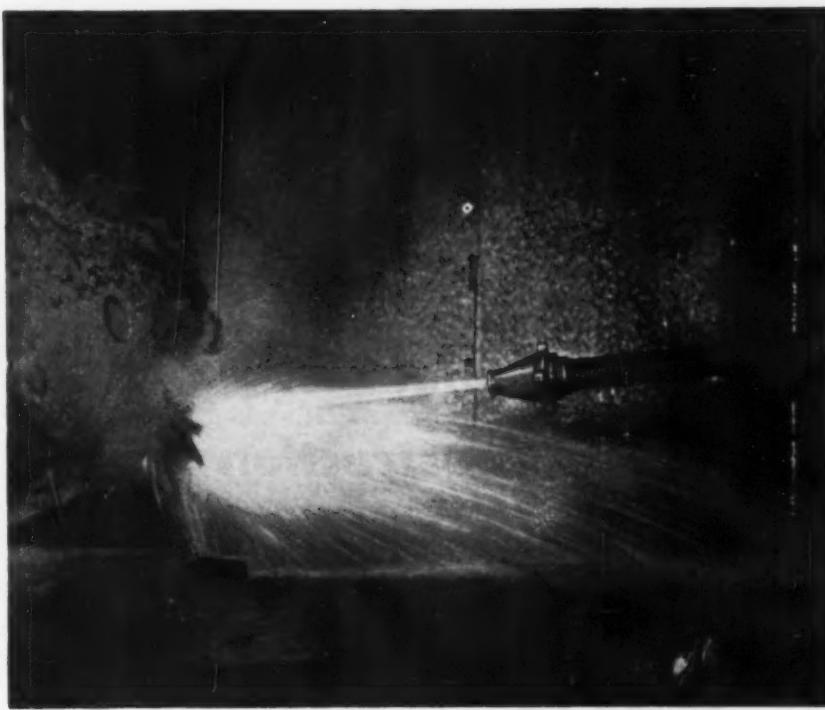
For Delta's metal cutting band saw.

A screw feed attachment features a fingertip feed screw release for quick adjustment, a star wheel to provide efficient feed action with



little effort, an adjustable jaw usable in many positions for handling irregular shaped work, and a laterally adjustable pivot block. The entire screw assembly can be re-

Nordall* Is Wyandotte's New Emulsion Cleaner



HERE'S lots that's new about Nordall. Nordall hits a new high in emulsion detergency with a new low in cost. It's new in safety, too.

Nordall was designed for pressure spray washers, but it's also good for immersion or soak type cleaning. Try it, too, for cold cleaning of large equipment. Your Wyandotte Representative will be glad to suggest concentrations.

*Trade-mark

NORDALL

- Reduces evaporation loss with low volatility solvents
- Inhibits rust on ferrous metals
- Will not corrode any common metal
- Is stable in slightly acid, neutral or alkaline water
- Is stable at all normal operating temperatures
- Holds emulsion longer—floats soils out
- Is non-flammable, non-toxic

THE WYANDOTTE LINE —products for burnishing and burring, vat, electro, steam gun, washing machine and emulsion cleaning, paint stripping, acid pickling, related surface treatments and spray booth compounds. An all-purpose floor absorbent: Zorball—in fact, specialized products for every cleaning need.

Wyandotte Chemicals Corporation
WYANDOTTE, MICHIGAN

Service Representatives in 88 Cities



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design and construction service
in industrial cars**

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**ELIMINATE DELAYS with
Quick Acting JOHNSON Furnaces**

Heat treat high speed steels

Harden high carbon steels

Braze carbide tipped tools

JOHNSON No. 120 Hi-Speed

Heat treat tools, dies and small metal parts in your own plant. Quick Acting JOHNSON No. 120 Hi-speed delivers 1500° F. in 5 minutes, reaches 2300° F. in 30 minutes. Gets the job done fast to save time and gas. Temperatures easily regulated with accuracy. Firebox 5 x 7 3/4 x 13 1/2. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

\$145.50 F. O. B. Factory

There is a Quick Acting JOHNSON Unit for every toolroom and shop. Write for complete catalog. Johnson Gas Appliance Company, 598 E Avenue N. W., Cedar Rapids, Iowa

JOHNSON Since 1901  **FURNACES FOR INDUSTRY**

production ideas

Continued

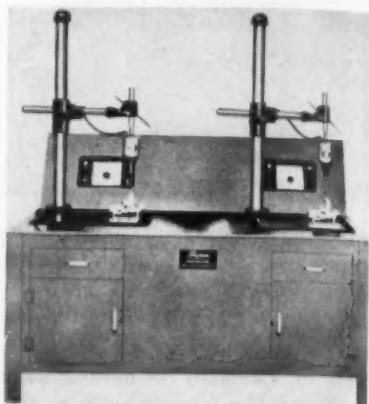
moved instantly to provide complete table clearance for handling larger work. An instruction sheet shows how to cut rectangular pieces, curves, and irregular shapes. *Delta Power Tool Div.*

For more data insert No. 40 on postcard, p. 35.

Metal Disintegrator

Handles motor blocks containing broken taps, on roller lines.

Made to specifications for a large automobile company, a twin Thomas Metalmaster metal disintegrator was installed as the key point of a conveyer line system. Motor blocks containing broken taps move on

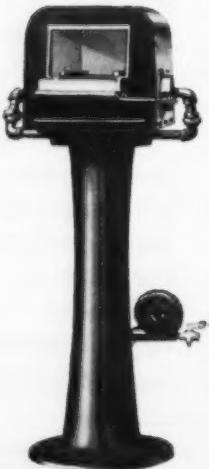


roller lines to each end of the Metalmaster where taps are removed swiftly. One worker handles both machines. *Warner Div. Clinton Machine Co.*

For more data insert No. 41 on postcard, p. 35.

Clutch Coupling

Allows for mounting flexible coupling on electric motor shafts.



The Series E Mercury clutch coupling is a complete unit consisting of a Series E Mercury clutch with provision for mounting a standard flexible coupling between it and the driven load. It is designed for installation on shafts of integral horsepower electric motors up to 15 hp rating. The unit used in conjunction with a flexible coupling is said to provide a satisfactory connection between the motor shaft and the driven shaft without the necessity of maintaining exact alignment. *Automatic Steel Products, Inc.*

For more data insert No. 42 on postcard, p. 35.
Resume Your Reading on Page 39

*market
briefs
and
bulletins*

IRON AGE markets and prices

black market—OPS opened an investigation in Cleveland of an alleged black market in scrap here, involving a consumer and a dealer. OPS officials said the complaints came from scrap dealers who refused to be drawn into the black market deals, involving payment of \$3 a ton over OPS ceiling prices for mixed scrap and unstripped motor blocks. OPS investigators claimed that material was being upgraded. Ceiling for unstripped motor block is \$43 a ton but \$46 a ton was being paid. This is the first complaint of a violation of the new iron and steel scrap regulations here.

Chicago plant readied—The first of 5500 machine tools were installed last week at Ford Motor Co.'s Chicago plant. There Ford will turn out Pratt & Whitney aircraft engines for which Ford holds prime contracts amounting to \$565 million. In addition, \$99 million is being spent for retooling and rehabilitation. Production will start within a year and employment will eventually reach 20,000.

scrap shortage pinches—The tight scrap situation on the West Coast is cramping small mills. Northwest Steel Rolling Mills may cut rolling operations to a 4-day basis because of the lack of ingots, attributed largely to poor grade scrap available for them. They now get nine heats a day where they normally get 12 because additional charges are needed. Isaacson Iron Works reports similar difficulty.

pouring concrete—Foundations are being poured for the new United States plant of the Hoeganoes Sponge Iron & Metal Corp., manufacturers of Swedish sponge iron and powder. The plant and docks are being built on a 114 acre tract at Riverton, N. J.

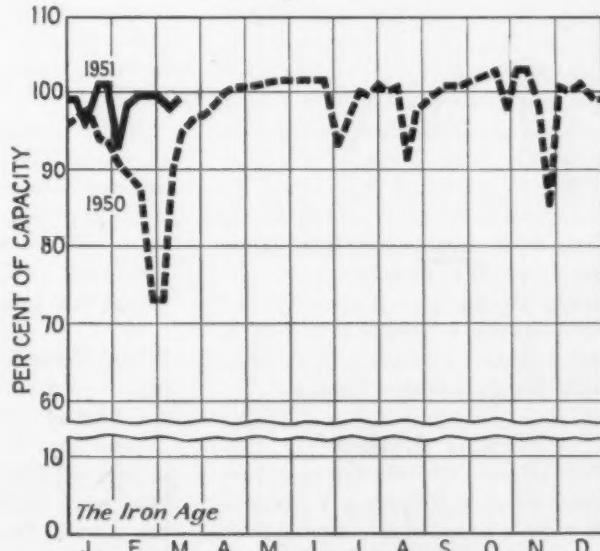
tighter and tighter—Wire rope, recently in good supply, is now becoming a scarce item in Philadelphia. Tool steel is the one item remaining on the good supply list—but for how long no one knows.

record backlog for cars—February delivery of new freight cars were 5842, a drop from the low rate of 5949 in January. Backlogs towered to an all-time high of 154,861 cars as of Mar. 1 with the help of February orders that reached 15,947, reported the American Railway Car Institute. The Institute explained that the 10,000 goal could not be reached until the allocations program had been in effect for at least 3 months—accounting for the time it takes to ship steel. March and April production will be stepped up.

renegotiation okayed—Contractors or subcontractors who do more than \$250,000 worth of business with the government in any one year must submit to renegotiation of their contracts under provisions of the excess-profits tax bill approved by Congress this week. President Truman's approval of the new law will mean compulsory renegotiation under a 5-man board until 1954.

if and when—Eastern warehouse floors are clean except for a few odd-size items. Salesmen are doing business on an "if and when received" basis.

Steel Operations**



District Operating Rates—Per Cent of Capacity**

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
Mar. 4	99.0*	104.0	94.5*	99.0	103.0	104.0	98.8*	104.0*	100.0	93.0	93.5	95.1	92.0	98.5*
Mar. 11	87.0	105.5	93.0	99.0	103.2	104.0	98.8	106.0	100.0	102.5	90.0	97.2	111.0	99.0

* Revised.

** Beginning Jan. 1, 1951, operations are based on an annual capacity of 104,229,650 net tons.

nonferrous metals

(Cen
IRON
FOUND
outlook and
market activities

NONFERROUS METALS PRICES

	Mar. 7	Mar. 8	Mar. 9	Mar. 10	Mar. 12	Mar. 13
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	\$1.60	\$1.39	\$1.34	....	....	....
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	16.80	16.80	16.80	16.80	16.80	16.80

Note: Quotations are going prices.

*Tentative



by R. Hatschek

Aluminum and DO's — The much-talked-about controlled materials plan is just about here as far as aluminum is concerned. It isn't CMP in name but here is how it works.

The consumer, say an aluminum foundry, has an order carrying DO rating, so he goes to the primary producers for some metal. But he finds that the primary producers have already fulfilled their DO requirements for the month and are booked well in advance on non-defense business.

Our foundryman then wires the fellow he keeps in Washington for just such situations. The latter takes up the problem with National Production Authority and NPA issues a directive to one of the primary producers to comply with the foundry's needs.

NPA Plans Revision — To provide fairer distribution of aluminum, NPA is planning a revision of the aluminum distribution order primarily to aid distributors and jobbers. Tentative plans are for a "minimum per item per order" system whereby aluminum mills would accept distributor orders as follows: Sheet or plate, 2000 lb; rod and bar, 1000 lb; tubing, 500 lb; extrusions, 500 lb; and an undetermined quantity of standard warehouse items.

Brass Ingot Prices — Reflecting the recent surges in scrap copper prices, ingot makers have boosted their prices from $\frac{1}{4}$ ¢ to 5¢ per lb. All categories except the 80-10-10 group were affected. It was pointed out that this new increase brings prices to the level of early January, before ingot makers dropped their prices in anticipation of lower scrap prices and better supply which never materialized.

In fact, ingot makers are paying about 27¢ per lb for No. 1 copper and sales are rumored at even higher prices. Dealers are now paying $23\frac{1}{2}$ ¢ per lb for No. 1 copper and proportionately high prices for other metals.

Tin Nosedive — The government's action of suspending all tin buying until prices reach a "reasonable level" just about kicked the bottom out of the markets here and in other parts of the world. From \$1.81 $\frac{1}{2}$ per lb on Mar. 1, the price plummeted to \$1.34 on Mar. 9, a drop of 47 $\frac{1}{2}$ ¢. Block tin scrap also nosedived to about \$1 per lb.

Complete Allocation — NPA announced on Monday that pig tin would go under a complete allocation program to domestic consumers. The order also named Re-

construction Finance Corp. as the sole importer of the metal into the United States. Allocations will be temporarily increased because of the seasonal necessity of canning more perishable foods. More complete details will be found in the *News of Industry* section.

On Tuesday, the New York market was in a state of complete confusion resulting from conflicting interpretations by RFC and NPA. No sales had been made by press time and it seemed that the biggest problem facing the government was just where to peg a "reasonable level" and resume trading. The trade was also awaiting the outcome of the Washington meeting on international control of tin supplies and prices.

Mercury Reclamation — In order to circumvent the spiral of foreign mercury prices and conserve material, General Dry Batteries, Inc., has started a program for reclaiming mercury from used mercury cell hearing aid batteries. Increased prices have inflated the cost of mercury until it now represents 65 pct of the cost of such batteries.

The company provides cartons for the return of these cells and suggests that hearing aid dealers do not order more than they need to conserve paper.

SCRAP . . . iron and steel

markets
prices
trends

Scrap shortage may trip up steelmaking rate
... Allocations increase . . . Cast scrap is
tightest item in some areas.

Telegrams marked urgent to NPA from scrap consumers who are watching the slow death of their stocks have brought an increase of allocations. Now NPA is reportedly considering allocation of scrap at dealer level. Material will go to those who need it most and make the best use of a slim supply by "equitable" distribution.

Many are positive that the steelmaking rate will tumble because of the scrap shortage that is hacking away at inventory. A toll on steelmaking is already being taken and all signs point to an increase. This can be labeled a national calamity

For story on vanishing scrap see p. 121.

because of the present crisis need for steel. Because defense will claim its full share, civilian production will take the punishment.

The cast scrap shortage is squeezing foundries more severely and in some areas cast is the tightest item in supply. Some sections reported upgrading and a preventive measure was advanced: setting of a single price on all openhearth scrap.

The overall picture of the market was one of low scrap movement. Even Boston which had until this time reported a fairly active market joined the rest of the sections in the doldrums, this week reporting a lower rate of scrap sales.

PITTSBURGH — National Production Authority is reportedly considering allocation of dealer scrap. There has been discussion of such a plan as a move to effect more equitable distribution. Such allocations would be mandatory. It is understood the plan under consideration

would prohibit dealers from shipping to mills known to have a fair inventory and give them a choice of shipping to specified hard-pressed consumers. This would be an extension of the existing allocation program whereby scrap generators have been directed to ship to hard-pressed mills. Meanwhile, reports of upgrading are becoming more prevalent although the situation here is said to be less serious than in the East.

CHICAGO—Scramble for scrap in the Chicago area is getting more intense. Upgrading is becoming more prevalent. One mill is reported to have rejected a considerable number of cars recently. Unconfirmed reports indicate some dealers are starting to ship through other dealers to pick up the broker's commission. Railroads are reported not satisfied with pricing schedules and are holding tonnages of unprepared heavy melting steel. Foundries are still in short supply.

PHILADELPHIA—The market here is moving along very slowly with dealers getting very little scrap. A few reports of upgrading still persist and there have been some mill rejections of material. Many men in the trade feel the only way to prevent upgrading is to set a single price for all openhearth scrap. Allocations are on the upswing and there is a feeling dealer scrap may soon be allocated. Imports have practically evaporated.

NEW YORK—The scrap market here was as spirited as an old nag on the way to the glue factory. Reports of upgrading and a large increase in allocations were circulating. Cast was very tight and true-blue No. 1 heavy melting was hard to locate. Some sources here feel that if the steelmaking rate doesn't tumble because of the shortage, it will be a miracle. Better weather may stimulate scrap collections but some think the market's troubles are more deep seated for weather to be too great an influence.

DETROIT—The expectation here is the Detroit water rate clause will be eliminated although no official action has yet been taken to clarify this controversial section of the scrap control regulations. Meanwhile, Detroit dealers have been asked to supply Washington with data on shipments. This is regarded as a prelude to complete scrap allocations, expected to become effective Apr. 1. Some dealers have already had government allocation orders,

according to the trade. Shipments are improving with better weather conditions. At the moment, cast iron scrap supplies appear to be substantially below demand.

CLEVELAND—Shipments continued to lag behind consumption here and in the Valley this week and the position of some major consumers is described as precarious. Indications are some production will be lost as the requirements of the present rate of operations are exceeding supply by an obvious margin. Consumers are requesting and getting allocations, but even this method equalizing distribution has limits. Consumers are fighting for every available car. Foundries are hardest hit.

ST. LOUIS—Rain, ice and snow have slowed shipments of scrap from agricultural sections to the St. Louis market. Material from railroads has also been cut sharply as the roads slow scrapping of equipment until new freight units are in hand. Inventories in hands of melters are low.

BIRMINGHAM—The cast scrap situation here is bad and pipe companies are crying for all grades. Despite efforts of dealers and brokers to supply customers, little is moving into the district. Mills using specialties, such as rail crops, foundry steel, structural and plate and axles also are in bad shape. Some consumers slowed buying before the price rollback and nearly everything went north. Allocations are sought.

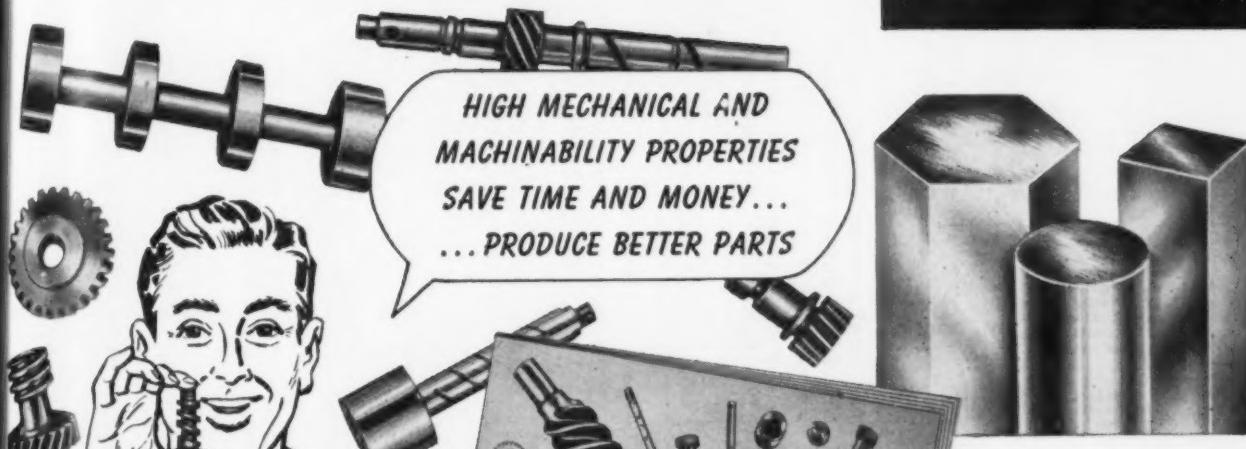
CINCINNATI—All consumers are scrambling for tonnage in a tight market here. Mills have been getting some allocations from the railroads but their inventory situation is anything but good. Foundries are desperate for tonnage and prospects for a speedy improvement in the supply of cast grades is dim indeed.

BOSTON—Scrap is becoming increasingly difficult to obtain and activity in the local scrap market area is slowing down. Untrimmed motor blocks remain below the ceiling at \$38 to \$39.

BUFFALO—With local supplies slashed, dealers are returning to a 5-day week. A top yard reports lay-offs. Some complain that mid-state material traditionally shipped here is being detoured. Mills are pressing for scrap as stocks get flatter. More talk is heard on a World War II style salvage drive. Dealers are limiting renewal orders to small tonnages.

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Solved with J&L Cold-Finished**

JALCASE 10



Maybe you haven't gotten the word yet, but more and more machinists are "discovering" Jalcase 10 (A.I.S.I. No. C-1144), the top grade of J&L Cold-finished Jalcase. And they're getting good results, too! Here's why.

Jalcase 10 is the highest carbon grade of Jalcase; it has high mechanical and machinability properties. This makes Jalcase 10 ideal for those tough "in between" machining applications. For instance:

Many times the finished-parts specifications on a job call for a high degree of hardness, but not as high as that obtained through heat-treating the finished part. In these applications, manufacturers and machinists have found it profitable to

use Jalcase 10 and dispense with the heat-treating altogether.

This saves production time and cuts down on costs. And Jalcase 10's high quality produces a better finish. It's worth your while to try Jalcase 10 on your screw machines.

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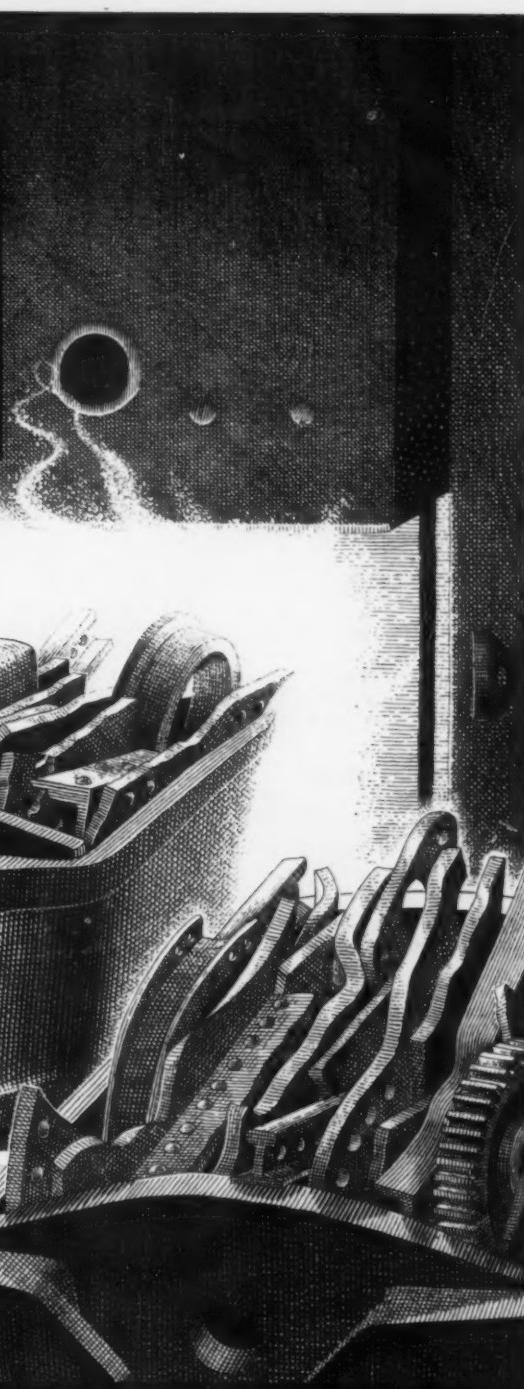
Iron and Steel SCRAP PRICES

(Maximum basing point prices, per gross ton, as set by OPS, effective Feb. 7, 1951. Shipping point and delivered prices calculated as shown below.)

Switching Charge (Dollars per gross ton) →		Basing Points →																																																																																																					
GRADES	OPS No.	Pittsburgh	Johnstown	Brackenridge	Butler	Mifflin	Meadville	Youngstown	Cleveland	Buffalo	Cincinnati	Middletown	Chicago	Clayton	Coatesville	Goshen	Harrisburg	Sparrows Pt.	Ashland, Ky.	Kokomo, Ind.	Portsmouth, O.	St. Louis	Detroit	Duluth	Kansas City	Birmingham	Alabama City	Atlanta	Minneapolis	Houston	Los Angeles	Portland, Ore.	San Francisco	Seattle																																																																					
No. 1 heavy melting	1	\$44.00	\$44.00	\$43.00	\$42.50	\$42.00	\$41.00	\$40.00	\$39.50	\$39.00	\$38.00	\$37.00	\$36.00	\$35.00	\$34.00	\$33.00	\$32.00	\$31.00	\$30.00	\$29.00	\$28.00	\$27.00	\$26.00	\$25.00	\$24.00	\$23.00	\$22.00	\$21.00	\$20.00	\$19.00	\$18.00	\$17.00	\$16.00	\$15.00	\$14.00	\$13.00	\$12.00																																																																		
No. 2 heavy melting	2	42.00	42.00	41.00	40.50	40.00	39.00	38.00	37.50	37.00	36.00	35.00	34.00	33.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00																																																																		
No. 1 busheling	3	44.00	44.00	43.00	42.50	42.00	41.00	40.00	39.50	39.00	38.00	37.00	36.00	35.00	34.00	33.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00																																																																
No. 1 bundles	4	44.00	44.00	43.00	42.50	42.00	41.00	40.00	39.50	39.00	38.00	37.00	36.00	35.00	34.00	33.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00																																																																
No. 2 bundles	5	41.00	41.00	40.00	39.50	39.00	38.00	37.00	36.50	36.00	35.00	34.00	33.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00																																																																			
Machine shop turnings	6	34.00	34.00	33.00	32.50	32.00	31.00	30.00	29.50	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00																																																																	
Mixed borings and turnings	7	38.00	38.00	37.00	36.50	36.00	35.00	34.00	33.50	33.00	32.00	31.00	30.00	29.50	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00																																																												
Shovelling turnings	8	38.00	38.00	37.00	36.50	36.00	35.00	34.00	33.50	33.00	32.00	31.00	30.00	29.50	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00																																																												
Cast iron borings	10	38.00	38.00	37.00	36.50	36.00	35.00	34.00	33.50	33.00	32.00	31.00	30.00	29.50	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00																																																												
No. 1 chemical borings	28	41.00	41.00	40.00	39.50	39.00	38.00	37.00	36.50	36.00	35.00	34.00	33.00	32.00	31.00	30.00	29.00	28.00	27.00	26.00	25.00	24.00	23.00	22.00	21.00	20.00	19.00	18.00	17.00	16.00	15.00	14.00	13.00	12.00	11.00	10.00	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00																																																										
Forge crops	11	51.50	51.50	50.50	50.00	49.50	49.00	48.50	48.00	47.50	47.00	46.50	46.00	45.50	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00
Bar crops and plate	12	49.00	49.00	48.00	47.50	47.00	46.00	45.50	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00						
Punchings and plate	14	46.50	46.50	45.50	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00										
Electric furnace bundles	15	46.00	46.00	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00											
Cut struct., plate, 3 ft and less	16	47.00	47.00	46.00	45.50	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00									
Cut struct., plate, 2 ft and less	17	49.00	49.00	48.00	47.50	47.00	46.50	46.00	45.50	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50	34.00	33.50	33.00	32.50	32.00	31.50	31.00	30.50	30.00	29.50	29.00	28.50	28.00	27.50	27.00	26.50	26.00	25.50	25.00	24.50	24.00	23.50	23.00	22.50	22.00	21.50	21.00	20.50	20.00	19.50	19.00	18.50	18.00	17.50	17.00	16.50	16.00	15.50	15.00	14.50	14.00	13.50	13.00	12.50	12.00	11.50	11.00	10.50	10.00	9.50	9.00	8.50	8.00	7.50	7.00	6.50	6.00	5.50	5.00	4.50	4.00	3.50	3.00	2.50	2.00	1.50	1.00					
Foundry steel, 2 ft and less	20	46.00	46.00	45.00	44.50	44.00	43.50	43.00	42.50	42.00	41.50	41.00	40.50	40.00	39.50	39.00	38.50	38.00	37.50	37.00	36.50	36.00	35.50	35.00	34.50																																																																														

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Empire Building	100 W. Monroe St.	111 Texas Av. Bldg.	Oliver Building
BOSTON, MASS.	CLEVELAND, OHIO	LEBANON, PENNA.	PUEBLO, COLORADO
Statler Building	1022 Midland Bldg.	Luria Building	334 Colorado Bldg.
BUFFALO, N. Y.	DETROIT, MICHIGAN	NEW YORK, N. Y.	READING, PENNA.
Genesee Building	2011 Book Building	100 Park Avenue	Luria Building
ST. LOUIS, MISSOURI			SAN FRANCISCO, CALIFORNIA
2110 Railway Exchange Bldg.			Pacific Gas & Elec. Co., Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices

Steel prices in this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel:	Mar. 13,	Mar. 6,	Feb. 13,	Mar. 14
(cents per pound)	1951	1951	1951	1950
Hot-rolled sheets	3.60	3.60	3.60	3.35
Cold-rolled sheets	4.35	4.35	4.35	4.10
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.40
Hot-rolled strip	3.50	3.50	3.50	3.25
Cold-rolled strip	4.75	4.75	4.75	4.21
Plate	3.70	3.70	3.70	3.50
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R-strip (No. 302)	36.50	36.50	36.50	33.00

Tin and Terneplate:

(dollars per base box)				
Tinplate (1.50 lb) cokes	\$7.50	\$7.50	\$7.50	\$7.50
Tinplate, electro (0.50 lb)	6.60	6.60	6.60	6.60
Special coated mfg. ternes	6.35	6.35	6.35	6.50

Bars and Shapes:

(cents per pound)				
Merchant bars	3.70	3.70	3.70	3.45
Cold finished bars	4.55	4.55	4.55	*4.145
Alloy bars	4.30	4.30	4.30	3.95
Structural shapes	3.65	3.65	3.65	3.40
Stainless bars (No. 302)	31.25	31.25	31.25	28.50
Wrought iron bars	9.50	9.50	9.50	9.50

Wire:

(cents per pound)				
Bright wire	4.85	4.85	4.85	4.50

Rails:

(dollars per 100 lb)				
Heavy rails	\$3.60	\$3.60	\$3.60	\$3.40
Light rails	4.00	4.00	4.00	3.75

Semifinished Steel:

(dollars per net ton)				
Rerolling billets	\$56.00	\$56.00	\$56.00	\$54.00
Slabs, rerolling	56.00	56.00	56.00	54.00
Forging billets	66.00	66.00	66.00	63.00
Alloy blooms billets, slabs	70.00	70.00	70.00	66.00

Wire Rod and Skelp:

(cents per pound)				
Wire rods	4.10	4.10	4.10	3.85
Skelp	3.35	3.35	3.35	3.15

Price advances over previous week are printed in Heavy Type; declines appear in Italics

Pig Iron:	Mar. 13,	Mar. 6,	Feb. 13,	Mar. 14
(per gross ton)	1951	1951	1951	1950
No. 2 foundry, del'd Phila.	\$57.77	\$57.77	\$57.77	\$50.42
No. 2, Valley furnace	52.50	52.50	52.50	46.50
No. 2, Southern Cin'ti	55.58	55.58	55.58	49.08
No. 2, Birmingham	48.88	48.88	48.88	42.88
No. 2, foundry, Chicago	52.50	52.50	52.50	46.50
Basic del'd Philadelphia	56.92	56.92	56.92	49.92
Basic, Valley furnace	52.00	52.00	52.00	46.00
Malleable, Chicago	52.50	52.50	52.50	46.50
Malleable, Valley	52.50	52.50	52.50	46.50
Charcoal, Chicago	70.56	70.56	70.56	68.56
Ferromanganese†	186.25	186.25	186.25	178.40

*The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

†Average of U. S. prices quoted on Ferroalloy page.

Scrap:

(per gross ton)	1951	1951	1951	1950
No. 1 steel, Pittsburgh	\$44.00*	\$44.00*	\$44.00*	\$32.25
No. 1 steel, Phila. area	42.50*	42.50*	42.50*	23.00
No. 1 steel, Chicago	42.50*	42.50*	42.50*	28.50
No. 1 hy. com. sh't, Det.	40.00*	40.00*	40.00*	25.50
Low phos. Young'n	46.50*	46.50*	46.50*	32.75
No. 1 cast, Pittsburgh	49.00†	49.00†	49.00†	39.50
No. 1 cast, Philadelphia	49.00†	49.00†	49.00†	35.50
No. 1 cast, Chicago	49.00†	49.00†	49.00†	39.50

*Basing Pt. †Shipping Pt.
Not including broker's fee after Feb. 7, 1951.

Coke: Connellsburg:

(per net ton at oven)	1951	1951	1951	1950
Furnace coke, prompt	\$14.25	\$14.25	\$14.25	\$14.00
Foundry coke, prompt	17.25	17.25	17.25	15.75

Nonferrous Metals:

(cents per pound to large buyers)	1951	1951	1951	1950
Copper, electro, Conn.	24.50	24.50	24.50	18.50
Copper, Lake, Conn.	24.625	24.625	24.625	18.625
Tin Straits, New York	\$1.34†	\$1.745*	\$1.825	75.25
Zinc, East St. Louis	17.50	17.50	17.50	10.00
Lead, St. Louis	16.80	16.80	16.80	10.30
Aluminum, virgin	19.00	19.00	19.00	17.00
Nickel, electrolytic	53.55	53.55	53.55	42.97
Magnesium, ingot	24.50	24.50	24.50	20.50
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50

†Tentative. * Revised.

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 130 of May 12, 1949, issue.)

Composite Prices

Finished Steel Base Price

Mar. 13, 1951.....	4.131¢ per lb.....
One week ago.....	4.131¢ per lb.....
One month ago	4.131¢ per lb.....
One year ago .....	.3837¢ per lb.....

High

High	Low
1951.... 4.131¢ Jan. 2	4.131¢ Jan. 2
1950.... 4.131¢ Dec. 1	3.837¢ Jan. 3
1949.... 3.837¢ Dec. 27	3.8705¢ May 3
1948.... 3.721¢ July 27	3.193¢ Jan. 1
1947.... 3.193¢ July 29	2.848¢ Jan. 1
1946.... 2.848¢ Dec. 31	2.464¢ Jan. 1
1945.... 2.464¢ May 29	2.396¢ Jan. 1
1944.... 2.396¢	2.396¢
1943.... 2.396¢	2.396¢
1942.... 2.396¢	2.396¢
1941.... 2.396¢	2.396¢
1940.... 2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939.... 2.35367¢ Jan. 3	2.26689¢ May 16
1938.... 2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937.... 2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936.... 2.32263¢ Dec. 28	2.05200¢ Mar. 10
1932.... 1.89196¢ July 5	1.83910¢ Mar. 1
1929.... 2.31773¢ May 28	2.26498¢ Oct. 29
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.	

High

High	Low
\$23.61 Mar. 20	\$23.45 Jan. 2

23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12

23.25 June 21	19.61 July 6
32.25 Mar. 9	20.25 Feb. 16

19.74 Nov. 24	18.73 Aug. 11
14.81 Jan. 5	13.56 Dec. 6

18.71 May 14	18.21 Dec. 17
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	

Scrap Steel

High	Low
\$43.00 per gross ton.....	
43.00 per gross ton.....	
43.00 per gross ton.....	
27.92 per gross ton.....	

\$22.00 Jan. 7	\$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9

22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7

21.92 Mar. 30	12.87 June 8
17.75 Dec. 21	12.67 June 8

8.50 Jan. 12	6.43 July 5
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printed
13, Mar. 14
1 1950
7 \$50.42
0 46.50
8 49.08
8 42.38
0 46.50
2 49.92
0 46.00
0 46.50
0 46.50
6 68.56
5 173.40
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0* \$32.25
0* 23.00
0* 28.50
0* 25.50
0* 32.75
0† 39.50
0† 35.50
0† 39.50

5 \$14.00
5 15.75

0 18.50
25 18.625
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ALTER

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Electric Furnace Grades
Open Hearth
Foundry Steel
Sheet Iron for Baling
Stainless Steel
Non-Ferrous Metals

IRON AGE

STEEL PRICES

Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page. Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extra charges

	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middle-town	Youngs-town	Bethle-hem	Buffalo	Consho-hocken	Johns-town	Sparrows Point	Grande City	Detroit		
INGOTS	\$52.00 ¹															
Carbon forging, net ton																
Alloy, net ton	\$54.00 ¹⁻¹⁷													\$54.00 ¹		
BILLETS, BLOOMS, SLABS	\$56.00 ¹⁻⁵	\$56.00 ¹	\$56.00 ¹						\$56.00 ³		\$56.00 ³					
Carbon, rerolling, net ton																
Carbon forging billets, net ton	\$66.00 ¹⁻⁶	\$66.00 ¹⁻⁴	\$66.00 ¹	\$66.00 ⁴	\$66.00 ⁴				\$66.00 ³⁻⁴	\$73.00 ¹⁻⁶	\$66.00 ³			\$80.00 ¹		
Alloy, net ton	\$70.00 ¹⁻¹⁷	\$70.00 ¹⁻⁴	\$70.00 ¹		\$70.00 ⁴			\$70.00 ³	\$70.00 ³⁻⁴	\$77.00 ¹⁻⁶	\$70.00 ³			\$73.00 ¹		
PIPE SKELP	3.35 ¹ 3.45 ⁸						3.35 ¹⁻⁴									
WIRE RODS	4.10 ² 4.30 ¹⁸	4.10 ^{2-4.33}	4.10 ⁶	4.10 ²			4.10 ⁶		4.10 ⁸		4.10 ³	4.20 ³				
SHEETS	3.60 ^{1-5.9-15} 3.75 ²⁴	3.60 ¹⁻²³	3.60 ¹⁻⁶⁻⁸	3.60 ⁴⁻⁵		3.60 ⁷	3.60 ¹⁻⁴⁻⁸ 4.00 ¹³		3.60 ³	4.00 ²⁶		3.80 ³	4.30 ²³	3.80 ¹³ 4.40 ¹⁷		
Hot-rolled (16 ga. & hvr.)																
Cold-rolled	4.35 ¹⁻⁶⁻¹⁵ 5.35 ⁶⁻⁷		4.35 ¹⁻⁶⁻⁸	4.35 ⁴⁻⁵		4.35 ⁷	4.35 ⁴⁻⁶		4.35 ³			4.35 ³	5.05 ²²	4.55 ¹²		
Galvanized (10 gage)	4.80 ^{1-9.15}		4.80 ¹⁻⁸		4.80 ⁴	4.80 ⁷	5.50 ⁴⁴ 6.00 ⁴⁴					4.80 ³	5.50 ²²			
Enameling (12 gage)	4.65 ¹		4.65 ¹⁻⁸	4.65 ⁴		4.65 ⁷	4.65 ⁶						5.35 ²²			
Long tones (10 gage)	5.20 ⁹⁻¹⁵		5.20 ¹			5.20 ⁷	6.00 ⁶⁴									
Hi str. low alloy, h.r.	5.40 ¹⁻⁵ 5.75 ⁹	5.40 ¹	5.40 ¹⁻⁸ 5.80 ⁶	5.40 ⁴⁻⁵			5.40 ¹⁻⁶⁻¹³ 5.90 ⁶		5.40 ³	5.65 ²⁶		5.40 ³	5.85 ¹²			
Hi str. low alloy, c.r.	6.55 ¹⁻⁸ 6.90 ⁶		6.55 ¹⁻⁸ 7.05 ⁶	6.55 ⁴⁻⁵			6.55 ⁴ 7.05 ⁶		6.55 ³			6.55 ³	7.10 ¹²			
Hi str. low alloy, galv.	7.20 ¹												6.75 ³			
STRIP	3.60 ^{6-4.00¹⁻⁵} 3.50 ⁶⁻⁷	3.50 ⁶	3.50 ¹⁻⁶⁻⁸			3.50 ⁷	3.50 ¹⁻⁴⁻⁸ 4.00 ¹³		3.50 ³⁻⁴	3.90 ²⁶	3.50 ³	3.50 ³	4.40 ¹⁷	3.80 ¹²		
Hot-rolled														4.10 ¹²		
Cold-rolled	4.65 ⁵⁻⁷⁻⁹ 5.00 ²⁶ 5.35 ⁴⁰⁻⁶³⁻⁵⁸	4.90 ⁶⁻⁶⁶	4.90 ⁶	4.65 ²⁻⁶		4.65 ⁷	4.65 ⁴⁻⁶ 5.25 ¹³⁻⁴⁹ 5.35 ¹³⁻⁴⁹		4.65 ³			4.65 ³	4.65 ¹²	5.45 ¹⁷	5.80 ⁴⁴⁻⁴¹	
Hi str. low alloy, h.r.	5.75 ⁹		5.50 ¹ 5.30 ^{6-5.80⁶}				4.95 ⁴ 5.50 ¹ 5.40 ¹³ 5.80 ⁶		4.95 ³	5.55 ²⁶		4.95 ³	5.95 ¹²			
Hi str. low alloy, c.r.	7.20 ⁹			(6.55 ² 6.70 ⁶)			(6.20 ⁴ 6.55 ¹³ 7.05 ⁶)		6.40 ³			6.40 ³				
TINPLATE¹	Cokes, 1.25-lb base box (1.50 lb, add 25¢)	\$8.45 ¹⁻⁵⁻⁹⁻¹⁵	\$8.45 ¹⁻⁶⁻⁸				\$8.45 ⁴					\$8.55 ³				
Electrolytic 0.25, 0.50, 0.75 lb box								0.25 lb. base box, \$7.15 ¹⁻⁴⁻⁵⁻⁸⁻⁹ ; \$7.25 ³⁻¹¹ ; \$7.35 ²² 0.50 lb., add 25¢; 0.75 lb. add 65¢								
BLACKPLATE, 20 gage	5.85 ¹ 6.15 ¹⁸		5.85 ¹				5.30 ⁴							3.85 ¹¹		
Hollowware enameling																
BARS	3.70 ¹⁻⁸ 3.85 ⁹	3.70 ¹⁻⁴⁻²³	3.70 ¹⁻⁴⁻⁶⁻⁸	3.70 ⁴	3.70 ⁴		3.70 ¹⁻⁴⁻⁸		3.70 ³⁻⁴		3.70 ³			3.85 ¹¹		
Carbon steel														4.30 ¹²		
Reinforcing	3.70 ¹⁻⁸	3.70 ⁴	3.70 ¹⁻⁶⁻⁸	3.70 ⁴			3.70 ¹⁻⁴⁻⁸		3.70 ³⁻⁴		3.70 ³	3.70 ³		4.30 ¹²		
Cold-finished	4.55 ²⁻⁶⁻⁸ 52.69.71	4.55 ³⁻⁶⁻⁷⁰ 23.78	4.55 ¹⁻⁷⁴ 73	4.55 ²	4.55 ⁴⁻⁸²		4.55 ⁶⁻⁸⁷		4.80 ⁷					4.70 ¹²		
Alloy, hot-rolled	4.30 ¹⁻¹⁷	4.30 ¹⁻⁴⁻²³	4.30 ¹⁻⁶⁻⁸		4.30 ⁴		4.30 ¹⁻⁶	4.30 ⁸	4.30 ³⁻⁴		4.30 ³		4.45 ¹¹	4.55 ¹²		
Alloy, cold-drawn	5.40 ¹⁷⁻⁸⁹ 69.71.2	5.40 ⁴⁻³³⁻⁶⁹ 78.72	5.40 ⁴⁻⁷⁸ 74		5.40 ⁴⁻⁸² 83		5.40 ⁶⁻²⁵⁻⁸⁷	5.40 ⁸	5.40 ³	5.40 ³				5.55 ¹⁴		
Hi str. low alloy, h.r.	5.55 ¹⁻⁸		5.55 ¹⁻⁸ 6.05 ⁸	5.55 ⁴⁻⁵			5.55 ¹ 6.05 ⁶	5.55 ³	5.55 ³		5.55 ³					
PLATE	3.70 ¹⁻⁵⁻¹⁸ 4.00 ⁹	3.70 ¹⁻²³	3.70 ¹⁻⁶⁻⁸	3.70 ⁴⁻⁵			3.70 ¹⁻⁴⁻⁶ 3.95 ¹³		3.70 ³	4.15 ²⁸	3.70 ³	3.70 ³	4.10 ¹²			
Carbon steel																
Floor plates	4.75 ¹	4.75 ¹	4.75 ⁸	4.75 ⁵					4.75 ²⁸							
Alloy	4.75 ¹	4.75 ¹	4.75 ¹				5.20 ¹³		5.05 ²⁸	4.75 ³	4.75 ³					
Hi str. low alloy	5.65 ¹⁻⁸	5.65 ¹ 6.00 ⁶	5.65 ¹⁻⁸ 6.15 ⁶	5.65 ⁴⁻⁵			{ 5.65 ⁴ 5.70 ¹³ 6.15 ⁶		5.90 ¹⁶	5.65 ³	5.65 ³					
SHAPES, Structural	3.65 ¹⁻⁶ 3.90 ⁹	3.65 ¹⁻²³	3.65 ¹⁻⁸					3.70 ³	3.70 ³		3.70 ³			4.25 ¹²		
Hi str. low alloy	5.50 ¹⁻⁶	5.50 ¹	5.50 ¹⁻⁸ 6.00 ⁶				6.00 ⁶	5.50 ³	5.50 ³		5.50 ³					
MANUFACTURERS' WIRE	4.85 ²⁻⁸ 5.10 ¹⁸	4.85 ² 4.22-33-34		4.85 ²			4.85 ⁶	Kakomo = 4.95 ¹⁰ 4.85 ¹⁵		4.85 ³	4.95 ³	Duluth = 4.85 ⁹				
Bright																
PILING, Steel Sheet	4.45 ¹	4.45 ¹	4.45 ⁸						4.45 ³							

Smaller numbers indicate producing companies. See key at right.
Prices are in cents per lb unless otherwise noted. Extras apply.

WEST COAST Seattle, San Francisco, Los Angeles, Fontana				IRON AGE STEEL PRICES
F = \$79.00 ¹⁹				INGOTS Carbon forging, net ton
F = \$80.00 ¹⁹				Alloy, net ton
F = \$75.00 ¹⁹				BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
F = \$85.00 ¹⁹ SF, LA, S = \$85.00 ⁶²				Carbon forging billets, net ton
Geneva = \$66.00 ¹⁸				Alloy net ton
F = \$89.00 ¹⁹ LA = \$90.00 ⁶²				PIPE SKELP
Worcester = 4.40 ² Minnequa = 4.35 ¹⁴ Portsmouth = 4.30 ²⁰				WIRE RODS
SF = 4.90 ² , F = 4.90 ¹⁹ LA = 4.90 ²⁴				SHEETS Hot-rolled (18 ga. & hr.)
Niles = 5.25 ⁴ , Geneva = 3.70 ¹⁸ Ashland = 3.80 ⁷				Cold-rolled
F = 4.55 ¹⁹				Galvanized (10 gage)
SF = 5.30 ²⁴ F = 5.30 ¹⁹				Enameling (12 gage)
Ashland = 4.80 ⁷ Kokomo = 5.20 ³⁰				Long tenses (10 gage)
F = 4.80 ¹¹				Hi str. low alloy, h.r.
SF, LA = 5.55 ²⁴				Hi str. low alloy, c.r.
Ashland = 4.85 ⁷				Hi str. low alloy, galv.
F = 5.40 ¹¹				STRIP Hot-rolled
F = 6.35 ¹⁹				Cold-rolled
F = 7.50 ¹⁹				Hi str. low alloy, h.r.
F = 8.00 ¹¹				Hi str. low alloy, c.r.
F = 8.35 ¹⁹				Hi str. low alloy, galv.
F = 8.40 ¹¹				TINPLATE Cokes, 1.25-lb base box (1.50 lb, add 25¢)
SF, LA = 4.25 ²⁴				Electrolytic 0.25, 0.50, 0.75 lb box
F = 4.75 ¹⁹ , S = 4.50 ⁶²				BLACKPLATE, 29 gage Hollowware enameling
F = 4.50 ¹⁹				BARS Carbon steel
F = 4.60 ¹¹				Reinforcing
F = 4.70 ¹⁹				Cold-finished
F = 4.70 ¹¹				Alloy, hot-rolled
F = 4.80 ¹¹				Alloy, cold-drawn
F = 4.85 ¹¹				Hi str. low alloy, h.r.
F = 5.00 ¹¹				PLATE Carbon steel
F = 5.10 ¹¹				Floor plates
F = 5.10 ¹¹				Alloy
F = 5.20 ¹¹				Hi str. low alloy
F = 5.30 ¹¹				SHAPES, Structural
F = 5.40 ¹¹				Geneva = 5.50 ¹⁰
F = 5.50 ¹¹				Hi str. low alloy
F = 5.60 ¹¹				MANUFACTURERS' WIRE Bright
F = 5.65 ¹¹				
F = 5.70 ¹¹				
F = 5.70 ¹¹				
F = 5.75 ¹¹				
F = 5.80 ¹¹				
F = 5.85 ¹¹				
F = 5.90 ¹¹				
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F = 11.95 ¹¹				
F = 12.00 ¹¹				
F = 12.05 ¹¹				

STAINLESS STEELS

Base price, cents per lb., f.o.b. mill.

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	14.25	15.00	16.50	16.00	24.25	19.75	21.50	12.75	14.75	13.00
Slabs, billets rerolling	18.50	19.75	21.75	20.75	31.75	26.00	28.25	16.50	20.00	16.75
Forg. discs, die blocks, rings	34.00	34.00	36.50	35.50	52.50	40.00	44.50	28.00	28.50	28.50
Billets, forging	26.25	26.25	28.75	27.50	41.00	31.00	34.75	21.50	22.00	22.00
Bars, wires, structural	31.25	31.25	33.75	32.75	48.75	36.75	41.25	25.75	26.25	26.25
Plates	33.00	33.00	35.00	35.00	51.50	40.50	45.00	27.00	27.50	27.50
Sheets	41.00	41.00	43.00	43.00	56.50	49.00	53.50	36.50	37.00	39.00
Strip, hot-rolled	26.50	28.00	32.25	30.00	48.25	36.75	41.00	23.50	30.25	24.00
Strip, cold-rolled	34.00	36.50	40.00	38.50	58.50	48.00	57.00	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—Sheets: Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38 (type 316 add 5¢); 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Ft. Wayne, Ind., 67; Lockport, N. Y., 45. Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38 (type 316 add 5¢); W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 80; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, Pa., 13; Butler, Pa., 7; Wallingford, Conn., 104.

Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport, Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago, 1; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42; Ft. Wayne, Ind., 67.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Ft. Wayne, Ind., 67; Trenton, N. J., 45; Harrison, N. J., 80; Baltimore, 7; Dunkirk, 28; Monessen, 103; Syracuse, N. Y., 17; Bridgeville, Pa., 59.

Structural: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44; Syracuse, N. Y., 17.

Plates: Brackenridge, Pa., 28 (type 416 add 5¢); Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 1, 17; Syracuse, 17; Ferndale, Mich., 28; Washington, Pa., 39.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1; Syracuse, N. Y., 17.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails										
	Woven Wire	Fence Posts	Single Loop	Twisted	Barbed	Gal. Barbed	Wire	Merch. Wire	Amild	Merch. Wire	Gal. (1)
Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.	Base Col.
Alabama City-4	118	126	123	136	5.70	5.95					
Alliquipia, Pa.-5	118	132	136	140	5.70	6.15					
Atlanta-65	121	133	126	126	5.95	6.40					
Bartonsville-34	118	130	140	123	143	143	5.95	6.15			
Buffalo-85							4.85				
Cleveland-86	125						5.70	6.18			
Cleveland-2											
Crawfordsville-57	132			145	5.95	6.40					
Donora, Pa.-2	118	130	123	140	5.70	6.15					
Duluth-2	118	130	123	140	5.70	6.15					
Fairfield-11	118	130	123	136	5.70	6.15					
Houston-83	126	138			4.80	6.10					
Johnstown, Pa.-3	118	130		140	5.70	6.15					
Joliet, Ill. 2	118	130	123	140	5.70	6.15					
Kokomo, Ind.-30	120	132	125	138	5.80	6.05					
Los Angeles-62							6.65				
Kansas City-3	130	130	142	135	152	6.30	6.75				
Minnequa-14	123	138	130	128	146	5.95	6.45				
Monessen-18	124	135			145	5.95	6.40				
Moline, Ill.-4		136									
Palmer-85											
Pittsburgh-2											
Cal.-21	137	149	147	166	160	6.85	6.80				
Portsmouth-20	124	137	147	147	6.10	6.60					
Rankin, Pa.-2	118	130	140	140	5.70	6.15					
So. Chicago, Ill.-4	118	126	140	123	138	5.70	5.95				
S. San Fran.-14		147		160	6.85	7.10					
Sparrows Pt.-3											
Sparrows Pt.-3											
Cleveland-4											
Oakland-19											
Pittsburgh-6											
Pittsburgh-10											
St. Louis-32											
Sharon-90											
Pittsburgh-68											
Wheeling-15											
Wheatland-89											
Youngstown-6											

Cut Nails, carloads, base, \$6.75 per 100 lb. (less 20¢ per jobber), at Conshohocken, Pa., (26), Wareham, Mass. (53), Wheeling, W. Va. (15). (1) Alabama City and So. Chicago do not include zinc extra.

CAST IRON WATER PIPE

Per Net Ton
6 to 24-in., del'd Chicago. \$105.30 to \$108.80
6 to 24-in., del'd N. Y.... 108.50 to 109.50
6 to 24-in., Birmingham. 91.50 to 96.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less..... \$108.50 to \$113.00
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about \$200 per net ton.

	BUTTWELD										SEAMLESS										
	1/2 in.	3/4 in.	1 in.	1 1/4 in.	1 1/2 in.	2 in.	2 1/2 in.	3 in.	2 in.	2 1/2 in.	3 in.	1 1/4 in.	1 1/2 in.	2 in.	2 1/2 in.	3 in.	2 in.	2 1/2 in.	3 in.	1 1/4 in.	
BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.	BLK.	Gal.
STANDARD																					
T. & C.																					
Sparrows Pt.-3	34.0	12.0	37.0	16.0	39.5	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0							
Cleveland-4	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0							
Oakland-19	24.5	8.0	30.8	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0							
Pittsburgh-6	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	26.0	8.0	32.5	11.5	34.5	13.0	
Pittsburgh-10	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	26.0	9.5	32.5	12.5	34.5	14.0	
St. Louis-32	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0							
Sharon-90	36.0	13.0	39.0	17.0	41.5	20.5	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0							
Pittsburgh-68	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.5	42.5	23.0	43.0	23.5	43.5	24.0	20.5	32.5	8.0	32.5	11.5	34.5	13.0
Wheeling-15	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.5	42.5	23.0	43.0	23.5	43.5	24.0	20.5	32.5	8.0	32.5	11.5	34.5	13.0
Wheatland-89	36.0	14.0	39.0	17.0	41.5	21.5	42.0	22.5	42.5	23.0	43.0	23.5	43.5	24.0	20.5	32.5	8.0	32.5	11.5	34.5	13.0
Youngstown-6	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	20.5	32.5	9.5	32.5	12.5	34.5	14.0

Galvanized discounts based on zinc at 17¢ per lb., East St. Louis. For each 1¢ change in zinc, discounts vary as follows:
1/2 in., 3/4 in., 1 in., 1 1/4 in., 1 1/2 in., 2 in., 3/4 pt.; 2 1/2 in., 3 in., 1 1/2 in. Calculate discounts on even cents per lb. of zinc, i.e., if zinc is 16.5¢ per lb., use 17¢.
Threads only, butt-weld and seamless. 1 pt. higher discount. Plain ends, butt-weld and seamless, 3 in. and under, 3 1/2 pt. higher discount. Butt-weld jobbers' discount, 5 pt.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb.	No. 1 Str.	Light Rail	Joint Bars	Track Spikes	Axes	Scrub Spikes	Tie Plates	Track Bolts Tread
	Rails							
Bessemer-1	3.60	4.00	4.70					
Chicago-4	3.60	4.00						
Ensley-11	3.60	4.00						
Fairfield-11	3.60	4.00						
Gary-1	3.60	4.00						
Ind. Harbor-8	3.60	4.00	4.70	5.15	5.25	5.80	4.50	
Johnstown-3	3.60	4						

WAREHOUSES

Base price, f.o.b., dollars per 100 lb. *Metropolitan area delivery, add 20¢ except Birmingham, San Francisco, Cincinnati, New Orleans, St. Paul, add 15¢; Memphis, add 10¢; Philadelphia, add 25¢; New York, add 30¢.

City	Sheets			Strip		Plates	Shapes	Bars		Alloy Bars								
	Hot-Rolled	Cold-Rolled (15 gauge)	Galvanized (10 gauge)	Hot-Rolled	Cold-Rolled			Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled A 4615	As rolled	Hot-Rolled A 4110	Annealed	Hot-Rolled A 4615	As rolled	Hot-Rolled A 4140	Annealed
Baltimore	5.60	8.84	7.49*	6.04	.....	5.80	6.14	6.04	6.84	6.89	10.24	10.54	11.89	12.19	.....	.....	.....	.....
Birmingham*	5.60	6.40	6.75	5.55	.....	6.95	5.70	5.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston	6.20	7.00	7.74	6.15	8.50*	6.48	6.20	6.05	6.79	10.25	10.55	11.80	12.20	.....	.....	.....	.....	.....
Buffalo	5.60	6.40	7.74	5.88	.....	6.05	5.80	5.60	6.40	10.15	10.45	11.80	11.95	.....	.....	.....	.....	.....
Chicago	5.60	6.40	7.75	5.55	.....	5.80	5.70	5.55	6.30	9.80	10.10	11.45	11.75	.....	.....	.....	.....	.....
Cincinnati*	5.87	6.44	7.39	5.80	.....	6.19	6.09	5.80	6.61	10.15	10.45	11.80	12.10	.....	.....	.....	.....	.....
Cleveland	5.60	6.40	8.10	5.69	6.90	5.92	5.82	5.57	6.40	9.91	10.21	11.86	11.86	.....	.....	.....	.....	.....
Detroit	5.78	6.53	7.89	5.94	.....	5.99	6.09	5.84	6.56	10.11	10.41	11.78	12.06	.....	.....	.....	.....	.....
Houston	7.00	8.25	.....	.....	.....	6.85	6.50	6.85	9.35	10.35	11.25	.....	.....	12.75	.....	.....	.....	.....
Indianapolis, del'd.	6.00	6.80	8.15	5.95	.....	6.20	6.10	5.95	6.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas City	6.00	6.80	7.45	6.15	7.50	6.40	6.30	6.15	7.00	10.40	10.70	12.05	12.35	.....	.....	.....	.....	.....
Los Angeles	6.35	7.90	8.85	6.40	9.45*	6.40	6.35	6.35	8.20	11.30	11.30	13.20	13.50	.....	.....	.....	.....	.....
Memphis*	6.33	7.08	.....	6.33	.....	6.43	6.33	6.08	7.16	.....	.....	.....	.....	.....	.....	.....	.....	.....
Milwaukee	6.38	7.18	6.38	6.02	6.48	6.33	6.22	6.33	7.32	.....	.....	.....	.....	.....	.....	.....	.....	.....
H. R. C. O.	5.74	6.54	7.89	5.69	.....	5.94	5.84	5.69	6.44	9.94	10.24	11.88	11.88	.....	.....	.....	.....	.....
New Orleans*	5.70	6.59	.....	5.75	7.25	5.95	5.75	5.75	7.30	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York*	5.87	7.19*	8.14*	6.29	8.63*	6.28	6.10	6.12	6.99	10.05	10.38	11.70	12.10	.....	.....	.....	.....	.....
Norfolk	5.97	7.24	6.89	6.58	.....	6.50	6.50	6.50	6.54	10.15	10.45	11.80	12.20	.....	.....	.....	.....	.....
Philadelphia*	5.90	6.80	8.00	6.10	.....	6.05	5.90	6.05	6.86	9.90	10.20	.....	.....	.....	.....	.....	.....	.....
Pittsburgh	5.60	6.40	7.75	5.85	.....	5.75	5.70	5.55	6.15	9.80	10.10	11.45	11.75	.....	.....	.....	.....	.....
Portland	6.60	8.95	8.50	7.30	.....	6.80	6.95	6.90	.....	.....	12.15	.....	.....	.....	.....	.....	.....	.....
Salt Lake City	7.95	9.70	8.70	8.05	.....	8.05	6.75	7.85	9.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco*	6.85	8.05*	8.55	6.60	9.45*	6.50	6.45	6.45	8.20	11.30	11.30	13.20	13.50	.....	.....	.....	.....	.....
Seattle	7.05	8.60	9.20	9.05	.....	6.75	6.65	6.75	9.05	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis	5.80	6.65	8.00	5.80	8.00*	6.13	6.03	5.80	6.55	10.05	10.35	11.70	12.00	.....	.....	.....	.....	.....
St. Paul*	5.85	6.65	8.28	.....	.....	6.36	6.26	6.11	6.96	10.36	10.66	12.01	12.31	.....	.....	.....	.....	.....

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 lb to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 400 to 1999 lb; (4) 6000 lb and over; (5) 1500 to 9999 lb; (6) 2000 to 5999 lb.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Blast Furnace Silvery	Low Phos. Charcoal
Bethlehem-3	54.00	54.50	55.00	55.50	.....	.....	.....
Birmingham-4	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-51	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-92	48.38	48.88	.....	.....	.....	.....	.....
Buffalo-4	52.00	52.50	53.00	53.50	63.75	.....	.....
Buffalo-3	52.00	52.50	53.00	53.50	53.00	53.50	54.00
Chicago-94	52.00	52.50	52.50	53.00	53.00	53.50	54.00
Cleveland-2	52.00	52.50	52.50	53.00	57.00	.....	.....
Cleveland-4	52.00	52.50	52.50	53.00	53.00	53.50	54.00
Dairymen, Tex.-95	48.00	48.50	48.50	49.00	49.00	49.00	49.00
Dublin-94	52.00	52.50	52.50	53.00	53.00	53.50	54.00
Erie-94	52.00	52.50	52.50	53.00	53.00	53.50	54.00
Everett, Mass.-98	53.25	53.75	53.75	54.00	54.00	54.00	54.00
Fontana-19	58.00	58.50	58.50	59.00	59.00	59.00	59.00
Genoa, Utah-16	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Granite City, Ill.-102	53.90	54.40	54.90	55.00	55.00	55.00	55.00
Hubbard, Ohio-6	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Ironton, Utah-16	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Jackson, Ohio-97, 98	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Lyle, Tenn.-101	54.00	54.50	55.00	55.50	55.50	55.50	55.50
Menomonie-18	54.00	54.50	55.00	55.50	55.50	55.50	55.50
Meredith Island-99	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Pittsburgh-1	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Shreveport-100	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Steetown-3	54.00	54.50	55.00	55.50	56.00	56.00	56.00
Swedeland-28	56.00	56.50	57.00	57.50	57.50	57.50	57.50
Toledo-94	52.00	52.50	52.50	53.00	53.00	53.00	53.00
Troy, N. Y.-4	54.00	54.50	55.00	55.50	56.00	56.00	56.00
Youngstown-8	52.00	52.50	52.50	53.00	53.00	53.00	53.00

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, \$2 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. Subtract 30¢ per ton for phosphorus content over 0.70 pct. Silvery iron: Add \$1.50 per ton for each 0.50 pct silicon over base (8.01 to 8.50 pct) up to 17 pct. \$1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosilicon prices are \$1 over comparable silvery iron.

REFRACTORIES

(F.o.b. works)
Carloads, Per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5)	\$94.60
No. 1 Ohio	88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	88.00
No. 2 Ohio	79.30
Ground fire clay, net ton, bulk (except Salina, Pa., add \$1.50)	13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$94.60
Childs, Pa.	99.00
Hays, Pa.	100.10
Chicago District	104.50
Western Utah and Calif.	111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago	111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	16.50
Silica cement, net ton, bulk, Hays, Pa.	18.70
Silica cement, net ton, bulk, Ensley, Ala.	17.60
Silica cement, net ton, bulk, Chicago District	17.60
Silica cement, net ton, bulk, Utah and Calif.	24.70

Chrome Brick

Per Net Ton
Standard chemically bonded, Balt., Chester

..... \$82.00

Standard, Baltimore	\$104.00
Chemically bonded, Baltimore	93.00

..... \$62.70

Domestic, f.o.b. Baltimore,	.....
In bulk fines removed	.....
Domestic, f.o.b. Chewelah, Wash.	.....
In bulk	36.30
In sacks	41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add

10¢; Missouri Valley, add 20¢ \$13.00

COKE

Furnace, beehive (f.o.b. oven) Net Ton Connellsville, Pa. \$14.00 to \$14.50

Foundry, beehive (f.o.b. oven) Connellsville, Pa. \$17.00 to \$17.50

Foundry, oven coke

Buffalo, del'd. \$26.69

Chicago, f.o.b. 23.00

Detroit, f.o.b. 24.00

New England, del'd. 24.80

Seaboard, N. J., f.o.b. 22.00

Philadelphia, f.o.b. 22.70

Swedeland, Pa., f.o.b. 22.60

Painesville, Ohio, f.o.b. 24.00

Erie, Pa., f.o.b. 23.50

Cleveland, del'd. 25.72

St. Paul, f.o.b. 22.50

St. Louis 25.40

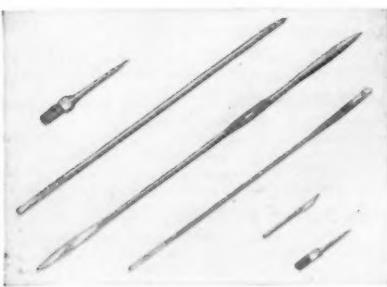
Birmingham, del'd. 21.69

Neville Island 23.00

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metal parts
precision-made
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TORRINGTON



Special equipment and volume production enable us to make precision parts for you at much lower costs.

For example, highest quality special needles for textile, leather, paper, etc., machinery. Pins for printing presses and surveyors' instruments. Special equipment assures proper heat-treatment . . . accurately formed eyes, grooves and shanks . . . precisely sharpened points . . . clean milling, knurling, slotting, and bevelling. Needles hand-straightened.

We are also set up to make such parts as knurled mandrels and spindles, screw driver and ice pick blades, instrument shafts and pivots, surgical and dental instruments, pen and pencil barrels, special rollers, studs, dowel pins, etc.

Send your prints and specifications today for a prompt quotation.

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555 Field Street • Torrington, Conn.

Makers of

TORRINGTON NEEDLE BEARINGS

IRON AGE MARKETS & PRICES FOUNDED 1855

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

	Pct Off List	Less Case	C.
1/4 in. & smaller x 6 in. & shorter	15	28 1/2	
9/16 in. & 5/8 in. x 6 in. & shorter	18 1/2	30 1/2	
5/8 in. & larger x 6 in. & shorter	17 1/2	29 1/2	
All diam. longer than 6 in....	14	27 1/2	
Lag, all diam. x 6 in. & shorter	23	35	
Lag, all diam. longer than 6 in.	21	33	
Plow bolts	34	...	

Nuts, Hot Pressed, Cold Punched—Sq

	Pct Off List	Less Keg	Keg (Reg.)	Less Keg (Hvy.)
1/4 in. & smaller	28 1/2	15	28 1/2	
9/16 in. & 5/8 in.	25	12	6 1/2	21
5/8 in. to 1 1/2 in.	1	9	23	16 1/2
1 1/2 in. & larger	22	7 1/2	2	16 1/2

Nuts, Hot Pressed—Hexagon

	26	37	22	34
9/16 in. & 5/8 in.	16 1/2	29 1/2	6 1/2	21
5/8 in. to 1 1/2 in.	12	25	2	17 1/2
1 1/2 in. & larger	8 1/2	23	2	17 1/2

Nuts, Cold Punched—Hexagon

	26	37	22	34
9/16 in. & 5/8 in.	23	35	17 1/2	30 1/2
5/8 in. to 1 1/2 in.	19 1/2	31 1/2	12	25
1 1/2 in. & larger	12	25	6 1/2	21

Nuts, Semi-Finished—Hexagon

	Reg.	Hvy.
1/4 in. & smaller	35	45
9/16 in. & 5/8 in.	29 1/2	40 1/2
5/8 in. to 1 1/2 in.	22	34
1 1/2 in. & larger	24	36
Light	15	28 1/2
7/16 in. & smaller	35	45
1/2 in. thru 5/8 in.	28 1/2	39 1/2
5/8 in. to 1 1/2 in.	26	37

Stove Bolts

	Pct Off List
Packaged, steel, plain finished	56—10
Packaged, plated finish.....	41—10
Bulk, plain finish**.....	67*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets

	Base per 100 lb.
1/4 in. & larger	\$7.85

	Pct Off List
7/16 in. & smaller	36

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham, Lebanon, Pa.

Cap and Set Screws

	Pct Off List
Hexagon head cap screws, coarse or fine thread, 1/4 in. thru 5/8 in. x 6 in., SAE 1020, bright.....	54
5/8 in. thru 1 in. up to & including 6 in.	48
5/8 in. thru 5/8 in. x 6 in. & shorter high C double head treat.....	46
5/8 in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes....	16
Fillister head cap, listed sizes.....	34
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	53

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads

21.60

Ton lots

23.75

Less ton lots

25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads

27.75

Ton lots

30.05

Less ton lots

31.85

Automatic

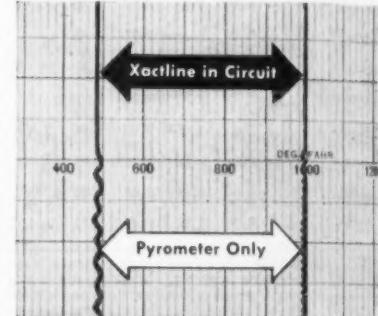
"STRAIGHT-LINE"
TEMPERATURE CONTROL

with
XACTLINE

ELIMINATE
Overshooting
Undershooting

Are you going to continue to put up with that troublesome overshooting and undershooting inherent in your conventional pyrometer control—especially when it is so easy to eliminate that saw-tooth effect?

Put XACTLINE in the control circuit. XACTLINE anticipates the temperature changes—before they occur. And too, it nullifies the varying amounts of thermal lag, residual heat, and mechanical lag—producing a short on-off cycle resulting in "Straight-Line" temperature control. This performance is possible because there is no dependence upon mechanical parts—XACTLINE operates electrically.



Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight-Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

XACTLINE is applicable to any indicating or recording pyrometer control of the millivoltmeter or potentiometer type. It should be used wherever close temperature control is required—any type of electrically heated oven, furnace, kiln, injection molding machine, and fuel-fired furnaces equipped with motor-operated or solenoid valves.

XACTLINE is a complete unit. No adjustment or coordination with the control instrument is required regardless of the size of the furnace, length of the heating cycle, or size of the load. Installation is very simple—can be either flush or surface mounted.

PRICE \$89.50 F.O.B. CHICAGO
Nothing else to Buy

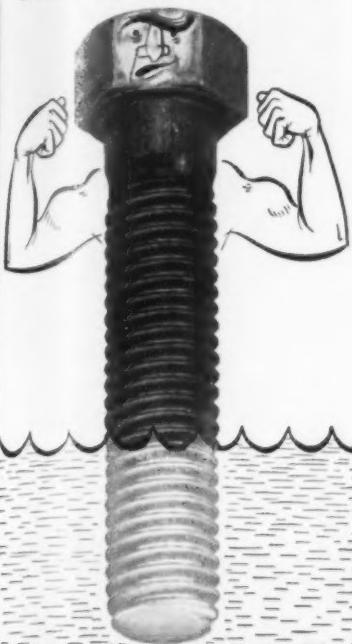
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TOUGH Cleaning Jobs Turn "SISSY"



Easy to Handle with

HOUGHTON'S HOUGHTO-CLEAN 220

Emulsion Type Cleaner

HOUGHTO-CLEAN 220 forms a stable non-foaming emulsion with water—hot or cold. It removes processing oils, dirt and coatings from metals without harming the surface. It is equally effective in spray, dip and power washing . . . for either ferrous or non-ferrous metals. And because it can be diluted as much as 1 to 50 parts for power washing you'll find HOUGHTO-CLEAN 220 most economical to use. Write E. F. Houghton & Co., Philadelphia 33, Pa.

This emulsion type cleaner can be used in many places instead of alkaline cleaning. Also, many users have found HOUGHTO-CLEAN 220 a superior replacement for either straight petroleum solvents or non-flammable solvents.

WRITE FOR DATA SHEET



Ready to give you
on-the-job service . . .

IRON AGE
FOUNDED 1855 MARKETS & PRICES

ELECTRODES

Cents per lb., f.o.b. plant, threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
GRAPHITE		
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
CARBON		
40	100, 110	8.03
35	65, 110	8.03
30	65, 84, 110	8.03
24	72 to 104	8.03
20	84, 90	8.03
17	60, 72	8.03
14	60, 72	8.57
10, 12	60	8.84
8	60	9.10

CLAD STEEL

Base prices, cents per pound, f.o.b. mill
Stainless-carbon Plate Sheet

No. 304, 20 pct,	Coatesville, Pa. (21) . . .	*29.5
Washgtn, Pa. (39) . . .	*29.5	
Claymont, Del. (29) . . .	*28.00	
Conshohocken, Pa. (26)	*24.00	
New Castle, Ind. (55) . . .	*26.50	*25.50
Nickel-carbon		
10 pct Coatesville (21) . . .	32.5	
Inconel-carbon		
10 pct Coatesville (21) . . .	40.5	
Monei-carbon		
10 pct Coatesville (21) . . .	33.5	
No. 302 Stainless-copper-stainless, Carnegie, Pa. (60) . . .	77.00	
Aluminized steel sheets, hot dip, Butler, Pa. (7) . . .	7.75	

*Includes annealing and pickling, or sandblasting.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$1.235
18	4	1	—	5	\$1.36
18	4	2	—	—	\$1.38
1.5	4	1.5	8	—	78.5¢
6	4	2	6	—	.87¢
High-carbon chromium . . .					63.5¢
Oil hardened manganese . . .					35¢
Special carbon . . .					32.5¢
Extra carbon . . .					27¢
Regular carbon . . .					23¢

Warehouse prices on and east of Mississippi are 3¢ per lb higher. West of Mississippi, 5¢ higher.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags...	7.4¢ to 9.0¢
Canadian sponge iron, del'd, in East . . .	10.00¢
Domestic sponge iron, 98+%	
Fe, carload lots . . .	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe . . .	36.0¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe . . .	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe . . .	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe . . .	83.0¢ to \$1.48
Aluminum . . .	29.00¢
Brass, 10 ton lots . . .	30.00¢ to 33.25¢
Copper, electrolytic, 10.75¢ plus metal value	
Copper, reduced . . .	10.00¢ plus metal value
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quantity . . .	\$3.50
Lead . . .	7.5¢ to 12.0¢ plus metal value
Manganese . . .	52.00¢
Molybdenum, 99% . . .	12.65
Nickel, unannealed . . .	88.0¢
Nickel, annealed . . .	95.0¢
Nickel, spherical, unannealed . . .	92.0¢
Silicon . . .	35.5¢
Solder powder . . .	6.5¢ to 8.5¢ plus met. value
Stainless steel, 302 . . .	83.00¢
Stainless steel, 316 . . .	51.10
Tin . . .	14.00¢ plus metal value
Tungsten, 99% . . .	54.15
Zinc, 10 ton lots . . .	23.0¢ to 30.5¢

News about

UNICHROME

Trade Mark

COATINGS for METALS

METALLIC • ORGANIC
DECORATIVE • PROTECTIVE



- Paint jobs last longer despite severe corrosives

Users of Ucilon® Protective Coatings report they are not only conserving equipment with maximum corrosion protection, but stretching the time between paint jobs as well. That's because Ucilon Coatings resist most acids, alkalies, salt solutions, moisture, petroleum products, corrosive fumes, alcohols and other strong chemicals.

*Trade Mark



- Dip Finishes give extra rust-resistance to zinc plated steel products

In defense work, or as a replacement finish, Unichrome Dips for zinc can help you. Different solutions produce a chromium-like clear, an iridescent yellow, a glossy dense black, or an olive drab finish—all corrosion-resistant. To produce them on steel, you use a supply-stretching .0003" of zinc plate.

Plastisol-clad metals last in corrosive service

By applying a Unichrome "Series 4000" Compound, you can often make cheaper, lighter, or available metals serve in place of more expensive alloys.

For these plastisol compounds have what it takes to withstand severely corrosive conditions. Namely . . . high chemical resistance of the vinyls . . . up to $\frac{1}{8}$ " film thickness for maximum chemical and physical endurance . . . flexibility to absorb wear and abuse.

Sprayed or dipped in a single application, Unichrome Plastisol Compounds are then baked at 350° F.

UNITED CHROMIUM, INCORPORATED

100 East 42nd St., New York 17, N. Y.

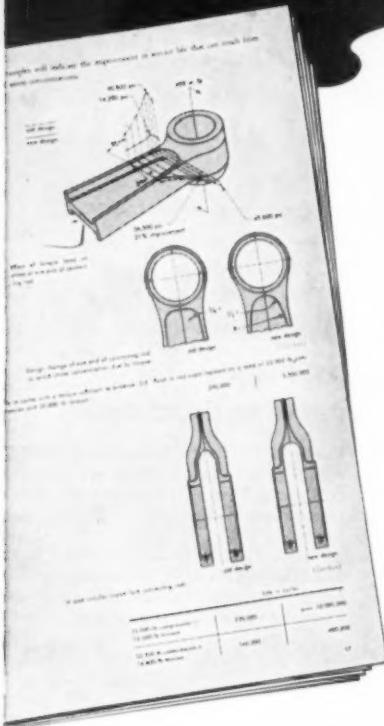
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Chicago 4, Ill. • Los Angeles 13, Calif.

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WHAT ABOUT STRESS RAISERS?

This book gives the answers..



How to avoid the localized stresses which start failure is a basic problem of design. This 72 page booklet analyzes many good and bad features of design. It also deals with problems of steel selection and treatment from the viewpoint of the design engineer—instead of the metallurgist.

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IRON AGE MARKETS & PRICES
FOUNDED 1855

ELECTRICAL SHEETS

22 Ga. H-R cut lengths

F.o.b. Mill Cents Per Lb.	Armatute	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech Bottom-15	7.25	8.50	9.30	9.85	10.40	11.10	
Brackenridge-28	7.25	8.50	9.30	9.85			
Follansbee-63	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Granite City-22	7.95	9.20					
Ind. Harbor-3	6.75	7.25					
Manfield-75	7.25	7.75	9.00	9.80			
Niles, O.-64	7.05	7.55					
Vandergrift-1	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Warren, O.-4	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Zanesville-7	6.75	7.25	8.50	9.30	9.85	10.40	11.10

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (66-72% Cr, 2% max. Si.)
0.06% C ... 30.50 0.10% C ... 29.50
0.10% C ... 30.00 0.60% C ... 29.25
0.15% C ... 29.75 1.00% C ... 29.00
2.00% C 28.75
65-69% Cr, 4-9% C 22.00
62-66% Cr, 4-6% C, 6-9% Si 22.85

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.
0.20% Max. C \$1.09
0.50% max. C 1.05
.00 min. C 1.04

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.00¢ per lb of contained Si. Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.20¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, dump, delivered.
30-33% Ca, 60-65% Si, 3.00% max. Fe.
Carloads 19.00
Ton lots 22.10
Less ton lots 23.00

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads 20.00
Ton lots 22.30
Less ton lots 23.80

CMSZ

Contract price, cents per lb of alloy, delivered.
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.
Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.
Ton lots 20.75
Less ton lots 22.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.
Ton lots 16.50¢
Less ton lots 17.75¢

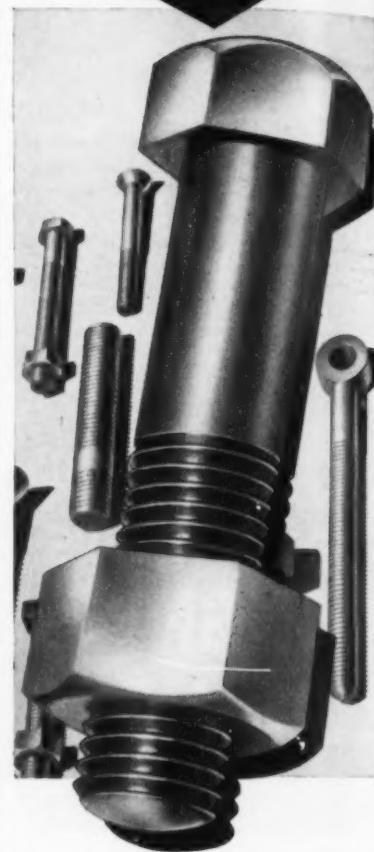
Graphidex No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload packed 18.00¢
Ton lots to carload packed 19.00¢
Less ton lots 20.50¢

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 6-7% Zr, 20% Fe, 1/4 in. x 12 mesh.
Ton lots 17.25
Less ton lots 18.50

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★ Stainless Steel

★ Heat-treated

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Alloy Steels

★ Naval Brass

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Many different types of linings and construction are used in PYROFLEX Constructed Units depending on type of service. Each unit is designed to meet the needs of the individual situation. PYROFLEX Constructions include:

- Acid Tanks**
- Fume Ducts**
- Brick Floors**
- Rinse Tanks**
- Acid Sewers**
- Plating Tanks**
- Pickling Tanks**
- Fume Scrubbers**
- Neutralizing Basins**

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303 Kelly Ave., Akron 9, Ohio

Acid and Alkali-proof Chemical Equipment

IRON AGE MARKETS & PRICES
FOUNDED 1855

FERROALLOYS

Ferromanganese

78-82% Mn. maximum contract base price, gross ton, lump size.
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont., Ashtabula, O. \$185
F.o.b. Johnstown, Pa. \$187
F.o.b. Sheridan, Pa. \$185
F.o.b. Etna, Clairton, Pa. \$188
\$2.00 for each 1% above 82% Mn, penalty, \$2.15 for each 1% below 78%.
Briquets—Cents per pound of briquet, delivered, 66% contained Mn.
Carload, bulk 10.95
Ton lots 12.55

Spiegeleisen

Contract prices gross ton, lump, f.o.b. 16-19% Mn 19-21% Mn
3% max. Si 3% max. Si
Palmerton, Pa. \$74.00 \$75.00
Pgh. or Chicago 74.00 75.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.
Carload, packed 29.75
Ton lots 31.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
Carloads 28
Ton lots 30
Less ton lots 32

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb. of contained Mn
..... 19.15¢

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.
Cast Turnings Distilled
Ton lots \$2.05 \$2.95 \$3.75
Less ton lots. 2.40 3.30 4.55

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.
Carload bulk 9.90
Ton lots 11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet 11.15
Ton lots 11.75

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$92.50 gross ton, freight allowed to normal trade area.
Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$83.00. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.
96% Si, 2% Fe. 21.70
97% Si, 1% Fe. 22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 1 lb Si briquets.
Carload, bulk 6.95
Ton lots 8.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.
25% Si 19.00 75% Si 14.30
50% Si 12.40 85% Si 15.55
90-95% Si 17.50

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd, Mn 85-90%.
Carloads Ton Less
0.7% max. C, 0.06% P, 90% Mn 26.25 28.10 29.30
0.07% max. C, 25.75 27.60 28.80
0.15% max. C, 25.25 27.10 28.30
0.30% max. C, 24.75 26.60 27.80
0.50% max. C, 24.25 26.10 27.30
0.75% max. C, 23.75 25.60 26.80
1.00% max. C, 23.25 25.10 26.30
7.00% max. Si 21.25 23.10 24.30

METAL SAVED

IS

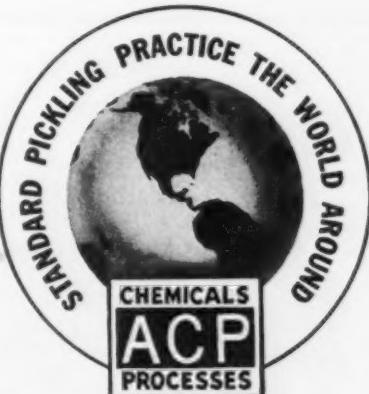
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SAVES ACID
SAVES MONEY
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"Granodraw" forms on pickled surfaces a tightly bound adherent, zinc-iron phosphate coating which facilitates the cold extrusion of steel, improves drawing, and lengthens die life.

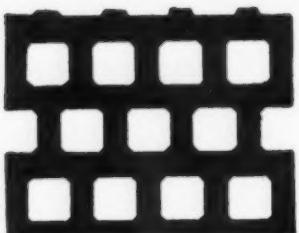
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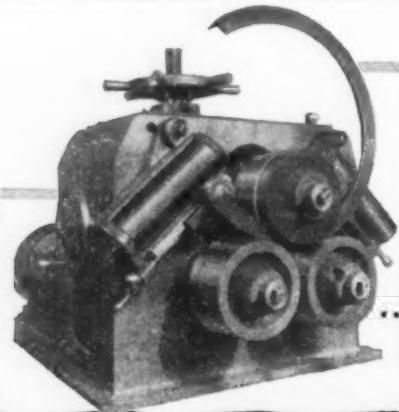


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BULLETIN 314
describes the four sizes
and is yours for the asking.
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17



IRON AGE MARKETS & PRICES FOUNDED 1855

Other Ferroalloys

Alsifer, 20%, Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	\$3.50
Ton lots	11.30
Calcium molybdate, 45-40%, f.o.b. Langethol, Pa., per pound contained Mo.	\$1.15
Ferrocolumbium, 50-60% 2 in. x D, contract basis, delivered, per pound contained Cb.	\$1.15
Ton lots	14.50
Less ton lots	1.15
Ferro-Tantalum - columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb or contained Cb plus Ta	\$1.15
Ferromolybdenum, 55-75%, f.o.b. Langethol, Pa., per pound contained Mo.	\$1.15
Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$3 unitage, per gross ton	\$65.00
10 tons to less carload	75.00
Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.15
Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	\$1.15
Less ton lots	1.15
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	\$127.00
Ferrotungsten, standard, lump or $\frac{1}{4}$ x down, packed, per pound contained W, 5 ton lots, delivered	\$3.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained V.	
Openhearth	\$3.00-\$3.00
Crucible	3.10-3.15
High speed steel (Primos)	3.25
Molybde oxide, briquettes or cans, per lb contained Mo, f.o.b. Langethol, Pa.	\$1.15
bags, f.o.b. Washington, Pa., Langethol, Pa.	\$1.15
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk lump	14.50
Ton lots, bulk lump	15.75
Less ton lots, lump	16.25
Vanadium pentoxide, 88-92% V_2O_5 , contract basis, per pound contained V_2O_5	\$1.15
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	31.00
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.	
Carload, bulk	7.00
Boron Agents	
Contract prices per lb of alloy, del. Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	\$5.35
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	454
Less ton lots, per pound	500
Carbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots, per pound	10.00
Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots	\$1.15
F.o.b. Wash., Pa.; 100 lb up	
10 to 14% B	.75
14 to 19% B	1.00
19% min. B	1.50
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	\$1.00
No. 6	.60
No. 79	.60
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.	
Ton lots	\$1.40
Less ton lots	1.45
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	\$1.10
Silcaz, contract basis, delivered.	
Ton lots	45.00

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NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Rebuilding Questions—An estimated 100,000 machine tools are in JANMAT reserves and the push of rising defense contracts demands their release into industry. Unfortunately many of these tools need rebuilding and to this end MDNA, at the prompting of the Military, is circulating a questionnaire to dig out some hidden rebuilding capacity.

MDNA has taken the stand that it's not in its province to classify any of its members as rebuilders and would be able to provide only sketchy information if they had that right. So the questionnaires are going right to the source. Firms can classify themselves as rebuilders and give the details of capacity and type.

Red Tape Minimum—Dealers will mail their questionnaires to Washington and MDNA warns that voluntarily submitting needed information may forestall "the necessity of commandeering facilities later." The government will later come out with a priority order for rebuilders to help them in the dogfight for restricted materials.

Red tape will be kept to a minimum. The prime or subcontractor withdrawing defective machines from the reserve will deal directly with the rebuilder. The rebuilding need is urgent and, in answering, the field's cooperation should be as strong as its desire to see America strong against an immoral foe.

Detroit Confusion—The steep climb of defense contracts let in Detroit has entangled the used machinery market in confusion. Most dealers have been assured that price control will be clarified along lines suggested by MDNA—but the eager question is when?

Tools and equipment for the greatly expanded aircraft program are much in demand. At

the head of the scarce list are tool room lathes, mills, shapers, and automatic screw machines. A step down in demand are presses, riveting machines and various types of control equipment, including magnaflux.

Stocks are Low—Detroit trade sources say that most machine tool stocks are low and few replacements are in sight. The large stocks of machines that accumulated after World War II have been knocked down by purchases of private buyers. A good portion has been moving out of the area.

Pleas to release idle machines and equipment are falling on stone deaf ears of plant managers who see the shortage and are clinging to their equipment as production insurance for defense contracts that may come later.

Rebuilding Roadblocks—Rebuilding here has picked up but the obstacles are many. Rebuilding demand in the immediate post-war period sagged and dealers avoided this work since it was performed in shops of auto plants and by new machine tool builders.

Now the government, stuck with many reserve machines that need rebuilding, needs increased capacity. New machine tool makers can only take a small fraction of this work because of unhealthily large backlog. Both groups are urging rebuilding. However, the trade reports that there exists a definite scarcity of parts and manpower.

Don't Hold Scrap—NISA has asked its members to sell copper scrap promptly and said scrap withholding is as bad as hoarding magnet wire. It makes less copper available to the overall supply.

NISA predicts that supply will be tight until copper ingots become more plentiful.